

GRAND VALLEY

(CONESTOGO • IRVINE
WHITEMAN (HORNER)
• RECREATION •)



CONSERVATION REPORT • 1954

DEPARTMENT OF PLANNING & DEVELOPMENT



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Sugar Maple forests such as this covered much of the good land of the Grand Watershed when its management was left to nature. Now, it is the responsibility of us who own the land to see that just as effective cover is provided for the soil even though necessity demands that it be an agricultural crop or pasture. Only thus can we maintain and improve the water economy of the Grand Valley.

Gov. Doc
Oat
P

Ontario, Planning and Development,
Dept. of

C420N
ER31
54668

DEPARTMENT OF PLANNING AND DEVELOPMENT

THE HONOURABLE W. K. WARRENDER, Minister

A. H. Richardson, Chief Conservation Engineer

GRAND VALLEY CONSERVATION REPORT 1954



TORONTO

1954

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18.3.55



Two hundred copies of this report
have been prepared, of which this
is

Number 121

Honorable Sir:

I have pleasure in transmitting
herewith the above Conservation Report for the
Grand Valley.

The report covers the history of the
Cassin's River, the main branch of the
Columbia River, the main branch of the
Columbia River, the main branch of the
Columbia River, and the history of the
Columbia River.

Yours very truly,

E. H. Bennett,
Chief Conservator of Fisheries

Toronto, September 17, 1902

Honourable W. K. Warrender, Minister,
Department of Planning and Development,
Parliament Buildings,
Toronto, Ontario.

Honourable Sir:

I take pleasure in transmitting
herewith the third Conservation Report for the
Grand Valley.

The report covers Forestry on the
Conestogo River, Whiteman Creek and Irvine Creek;
Wildlife on Whiteman Creek; Land Use on Horner
Creek; and Recreation on the whole of the Grand
Watershed.

Yours very truly,

A. H. Richardson,
Chief Conservation Engineer

Toronto, September 15, 1954.

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ACKNOWLEDGEMENTS

Thanks are extended to the many private citizens and municipal officials who have kindly given their time and effort to supply much of the information that was required for the preparation of this report. Many of the municipal clerks, treasurers and assessors have willingly given accurate statistical data at the cost of considerable personal effort.

Grateful acknowledgement is made to the Ontario Agricultural College at Guelph of the descriptions and maps of the soil types on Horner Creek and to Mr. I. C. Marritt, District Forester, for the co-operation of his staff.

The co-operation received from all groups was a clear manifestation of the interest of the people of the Grand Valley in the development of the conservation resources of the watershed and an encouragement to the persons making the survey.

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INTRODUCTION

The present report is the third major report presented to the Grand Valley Conservation Authority. The first was the Nith Report which covered the valley of that name embracing 432 square miles. It was presented to the Authority at Ayr on April 26, 1951, by the Honourable William Griesinger, Minister of the Department of Planning and Development at that time. The second report was the Speed, which included the river valley of that name and its tributary the Eramosa, embracing 303 square miles. This report was presented to the Authority at Elora on October 16, 1953, by the Chief Conservation Engineer on behalf of the Honourable W. K. Warrender, Minister of the Department of Planning and Development.

The present submission, entitled "Grand Valley Conservation Report 1954" covers certain aspects of conservation in the valleys of Whiteman Creek, the Conestogo River and Irvine Creek, in all embracing an area of 549 square miles. In addition an exhaustive study of the recreation for the whole Grand Valley is dealt with.

In the Forestry section of the Nith Report considerable space was given to the history of lumbering and other wood products. But as the pattern of these activities in the past is much the same for all of Western Ontario, this material was considerably abridged in the Speed Report and has been omitted from the present report.

Authority members and others who are interested in the historical aspect of lumbering and who have not had access to the Nith Report should borrow a copy of this from the municipal clerk, from departments of the governments concerned or from university libraries.

Certain other general material pertaining to forestry, such as methods of land acquisition, woodland improvement, scrubland, forest insects and diseases, snow

fences and windbreaks, and forest fire protection, have been repeated in whole or in part in this report for the sake of coherency.

Wildlife studies were carried out only on Whiteman Creek.

Land Use studies were confined to Horner Creek, a tributary of Whiteman Creek, and have been treated as a "Little Valley" study.

The Recreation section, as already mentioned, includes the whole Grand Valley and is the final report to the Authority covering this subject.

- A. H. RICHARDSON

RECOMMENDATIONS

RECOMMENDATIONS

STATED OR IMPLIED IN THIS REPORT

FORESTRY - on the Conestogo River, Irvine Creek and Whiteman Creek.

1. That the Conestogo, Irvine and Whiteman Forests be established and that they be expanded through a definite program of annual additions and planting until the total area of 1,105 acres is acquired and reforested. p. 22
2. That in areas in which it proves to be impossible to establish forests due to the high cost of land, the Authority work out a form of agreement to be made with landowners which will ensure that tree cover be maintained and restored on these lands. p. 39
3. That a policy of aiding landowners to reforest marginal lands be implemented by the Authority. The Authority should provide a tree-planting machine which would be furnished to the landowner along with a tractor and a planting crew for a nominal sum. The Authority should continue their assistance program for private reforestation by subsidizing planting on land too rough, too steep and too wet for machine planting. p. 41
4. That the Authority encourage the establishment of natural regeneration in and close to existing woodlands by instructing landowners in methods of scarifying soil and breaking sod immediately preceding the dispersal of seed by parent trees. This should be done in early September for most species and early June for elm and soft maples. p. 31
5. That the Authority inaugurate a scheme to aid farmers in fencing their woodlots from cattle. This would enable regeneration to establish itself, restore the spongy cover of leaves and humus over the soil and improve the water-holding capacity of the soil itself. p. 36

6. That the Authority purchase a portable wood chipper which would be made available to farmers in the same way as the tree-planter. This machine would be especially useful in cleaning up low grade hardwood and weed trees in woodlots. The chips can be used in place of straw for cattle bedding and chicken litter and spread on the fields as humus. In some cases it may be possible to sell such chips to pulp companies. p. 39

WILDLIFE - on Whiteman Creek

7. That the Authority take steps to control the pollution of the tributary of Whiteman Creek shown on the map "Biological Conditions of Streams". following p. 6
8. That the Authority urge landowners to construct trout ponds, of the types specified, on the larger cold tributaries; to install low dams and deflectors in the remaining trout water; and to plant alders for shade and fragile willow (Salix fragilis) for bank control. p. 11
9. That the Authority see that the introduction of fish in the watershed is restricted to those streams which are shown by the survey to be suitable habitat for the species concerned. p. 8
10. That the Authority sponsor the protection and improvement of a stretch of the stream as a demonstration which landowners could follow. p. 11

LAND USE - on Horner Creek

11. That the Authority arrange to supply a special labour force and special equipment to carry out stream channel improvement and special engineering features on farm land, such as diversion terraces, grassed waterways and gully control. p. 43
12. That the Authority integrate the work of farm organizations and commercial interests in promoting soil conservation practices on the land. p. 43

13. That the Authority sponsor Land Judging Competitions (similar to cattle judging competitions) to develop interest and knowledge of soil conservation. p. 43
14. That a Horner Creek Advisory Board be set up to carry through a concerted program of soil conservation in the valley of Horner Creek. p. 43
15. That a specialist be engaged for at least one summer to work in co-operation with county agricultural authorities in developing co-operation in soil conservation. p. 44
16. That the Authority establish demonstrations of contour tillage and improved pasture on land of restricted capability, either on lands it may acquire or by co-operative arrangement with local landholders on lands specified on the accompanying map of recommended land use. p. 44
17. That a gauge to measure stream flow be established on the stream to record, in future years, the benefits of improved land management on stream flow. p. 44
18. That co-operators be arranged with the Provincial Geologist for recording ground-water levels in the area. p. 44

RECREATION - on the Whole Grand Watershed

19. That, as below, six multi-purpose parklands with a combined area of 3,248 acres be established in the Grand Watershed by the Grand Valley Conservation Authority:

Elora Gorge Park	401	acres
Rockwood Park	432	"
Doon Park	861	"
Spottiswood and Pinehurst		
Lake Park	1,437	"
Byng Island Park	61	"
Parks of the Lower Grand	56	"

Total	3,248	acres
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20. That one hundred and twenty-five picnic sites and four lookout points be established within the Grand Watershed at locations indicated on the map accompanying this report. pp. 103 & 112

21. That a network of scenic routes be established within the Grand Watershed as shown on the map accompanying this report. The component parts of this network of routes are as follows:-

The Route of the Lower Grand River	93.9 miles
The Route of the Middle Grand River	76.3 "
The Route of the Upper Grand River	78.2 "
The Route of the Speed River	47.8 "
The Route of the Nith River	62.0 "
The Route of the Conestogo River	45.5 "

Total	403.7 miles
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p. 115

22. That the establishment of nature reserves for the preservation of the significant botanical, zoological, geological and physiographic features of the Grand Watershed be recognized as a specialized form of recreation development and that a separate committee of the Advisory Board on Recreation be established to deal with this.

p. 122

23. That the preservation of the historical material and buildings of the Grand Watershed be recognized as forming an important part of a comprehensive recreation program of the Grand Watershed, and that a special committee of the Advisory Board on Recreation be established to deal with this matter. p. 127

24. That the Grand Valley Conservation Authority undertake a well organized publicity campaign to gain public support for this proposed recreation program through the media of the press, radio and public lectures.

FORESTRY

CHAPTER 1
INTRODUCTION

1. General Remarks

The forestry surveys conducted during the summer of 1953 included the examination of three main tributaries of the Grand River. These studies included the Conestogo River, Irvine Creek and Whiteman Creek along with its main tributaries, Kenny and Horner Creeks. The presentation of the field data from these surveys has been arranged in a similar manner to the Nith and Speed Reports. This facilitates direct comparison of the data included in the graphs and charts for all the tributary watersheds within the Grand River system.

To simplify the presentation of the information in the forestry report, the data for the Conestogo and Irvine Creek have been combined. The similarity of conditions which exists in both watersheds and their proximity make the combination of the data valid. Whiteman Creek, however, due to dissimilarities in physiography and certain forest cover types, has been described separately with regard to present woodland conditions and forest harvesting.

This report describes the studies made on present woodland conditions, forest conservation measures in progress, conservation measures which are required and a summary of saw-mills and wood-using industries. Certain textual information has already been described in detail in the two previous reports; consequently this information has been presented in this report in summary form. If more detailed information is required, reference to the previous reports would be advisable.

2. Early Settlement

It is difficult to establish a concise pattern of settlement for these watersheds. Both Whiteman and the Conestogo watersheds lie on the fringe of important settlements such as the Burford, Oxford, Waterloo, Dumfries, Wilmot and the Canada

Company holdings, consequently both watersheds were primarily developed as fringe area settlements.

The lower portion of Whiteman Creek was opened for settlement in 1794 following a land purchase from the Mississauga Indians. The movement developed westward along the old post road (now a portion of Highway No. 53) and along Dundas Street. A small group led by Thomas Horner commenced to build the first sawmill on Horner's Creek west of Princeton in 1794, while other groups moved as far west as Oxford Centre during the same year. By 1812, these settlements had continued to expand until most of Burford and the southern portion of Blenheim Township had been settled. The northern portion of Blenheim Township was settled by expansion from the older German settlement near Blair and later from the development which accompanied the opening of the Huron Road by the Canada Company.

The first settlement on the Conestogo Watershed developed from a company which was formed by Bishop Ebby in 1813. The German Mennonite and Lutheran communities which resulted from this scheme settled most of Woolwich Township. The overflow from this settlement later expanded into Wellesley Township which was originally clergy reserve.

Settlement of the upper portion of the Conestogo and Irvine Watersheds developed primarily along the Fergus-Arthur Road from Guelph, along the Elora Road and from a general fringe area expansion from settled townships to the south and east such as the Erin and Eramosa settlements. These movements took place from 1825 to 1845 with a general filling-up period which lasted from ten to twenty years. The colonization of the lands in the Irvine Creek Watershed developed from the Gilkison settlement at Elora in 1832, the Fergusson and Webster settlement at Fergus in 1833 and from expansion of the Canada Company settlement in the Guelph area.

WOODLAND IN PER CENT AND ACRES - CONESTOGO WATERSHED

County	Township	Area of Town- ship 1941	1850		1860		1890		1910		1920		1930		1940	
			Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres
Waterloo	Waterloo	39,184	50	19,631	37	14,497	17	6,735	12	4,572	20.6	8,059	11	4,313	21.5	8,433
	Wellesley	65,066	59	38,379	40	26,067	19	12,207	11	6,982	10	6,768	10	6,326	9	5,643
	Woolwich	53,134	48	25,702	39	20,818	18	9,825	11	6,521	12	6,689	11	6,386	11	5,815
Wellington	Arthur	64,778			52	36,583	29	19,089	4	2,492	5	3,435	8	4,840	6	4,069
	Garafraxa W.	48,767	60	28,650	60	29,909	12	5,670	4	1,931	5	2,069	5	2,583	4	1,975
	Luther W.	47,461			31	14,468	53	26,603	6	2,903	6	2,646	7	3,275	6	3,038
	Maryborough	56,300	32	17,932	53	29,696	21	11,719	9	4,792	8	4,748	9	5,236	7	3,923
	Peel	74,445	47	34,812	48	35,881	16	11,642	7	5,266	7	5,473	6	4,738	6	4,405

WOODLAND IN PER CENT AND ACRES - IRVINE WATERSHED

County	Township	Area of Town- ship 1941	1850		1860		1890		1910		1920		1930		1940	
			Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres
Dufferin	Garafraxa E.	39,813					24	9,744	7	3,015	7	3,004	7	3,092	7	3,086
	Luther E.	39,176							4	1,436	4	1,516	5	1,747	3	1,292
Wellington	Garafraxa W.	48,767	59	28,650	61	29,909	12	5,670	4	1,932	4	2,069	5	2,583	4	1,975
	Luther W.	47,461			31	14,468	53	26,603	6	2,903	6	2,646	7	3,275	6	3,038
	Nichol	27,084	43	11,754	36	9,709	11	3,112	6	1,772	6	1,735	7	1,946	9	2,544
	Peel	74,445	47	34,802	48	35,881	16	11,642	7	5,266	7	5,473	6	4,738	6	4,405
	Pilkington	29,080	55	15,895	39	11,381	9	2,581	7	2,096	8	2,343	7	2,024	6	1,772

WOODLAND IN PER CENT AND ACRES - WHITEMAN WATERSHED

County	Township	Area of Township 1941	1850		1860		1890		1910		1920		1930		1940	
			Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres
Brant	Brantford	71,411	28	19,722	16	11,198	10	7,251	4	2,748	5	3,784	5	3,637	5	3,380
	Burford	68,313	34	22,991	32	21,838	16	10,980	8	5,541	8	5,482	8	5,728	8	5,677
Oxford	Blandford	29,769	43	12,814	33	9,874	15	4,456	6	1,850	8	2,397	8	2,238	9	2,666
	Blenheim	66,944	37	24,876	29	19,163	14	9,507	7	4,406	8	5,152	8	5,160	8	5,566
	Oxford E.	33,795	42	14,369	36	12,103	14	4,820	6	1,874	5	1,821	6	1,995	5	1,813
	Zorra E.	57,544	39	22,645	37	21,086	12	6,938	8	4,556	7	3,866	6	3,476	6	3,197
Perth	Easthope N.	43,123	47	20,200	36	15,390	10	4,456	12	5,352	12	5,008	12	5,152	12	5,176
	Easthope S.	23,945	50	11,993	37	8,790	34	8,069	9	2,242	8	1,980	8	2,000	7	1,720
Waterloo	Wilmot	61,520	39	24,144	31	18,940	14	8,409	10	6,173	10	6,357	10	6,208	10	5,877

3. The Forest

Little remains of the original forest of Southern Ontario, particularly in such areas as the Conestogo and Whiteman Watersheds where the land is mostly of high agricultural value. The vestiges of this forest which have survived and the works of contemporary writers during the settlement period help to reconstruct the scene.

Early descriptions of the forest cover in the southern portion of Whiteman Creek indicate that the original forest was predominantly oak and pine, while sugar maple and beech with associated southern hardwood species occupied the best soils. Soft maple and elm occupied similar but poorly drained soils, particularly on the heights of land between watersheds. Oak in open park-like groupings held possession of the sand plain in Burford Township, while scattered white pine grew in mixture with hardwood on well drained soils. White cedar and mixedwood white cedar, hemlock, white pine, soft maple and yellow birch grew on the moister sites. The mixedwood forests of the Whiteman Creek area vary widely from the woodlands of the Conestogo Watershed where hardwood stands of hard maple and beech predominated.

When new areas were opened for settlement, the forest was undoubtedly the greatest obstacle to agricultural development. The first problem which confronted the pioneer after building a shelter was to clear the forest so that the first crop could be sown. The forest, however, played an important part in the early development of these areas. By 1851, some fifty-five years after settlement had begun in Blenheim and Burford Townships, there were at least twenty-six sawmills in operation. These mills produced lumber which was required locally for settlement expansion and also exported softwoods to other parts of Ontario where timber was scarce. The Burford Township

* "In the London and Western Districts (of Upper Canada) ... there are not more pine and cedars than suffice for building material and fencing timber for home consumption. Indeed there are several townships in the Western District entirely destitute of pine timber ... a circumstance ... attended with many serious inconveniences". E. A. Talbot. Five Years Residence in Canada. 1824.

portion of Whiteman Creek lay on the fringe of an area which produced forests of huge oaks and white pine, both of which were in great demand for the square timber trade. In addition, large quantities were used for shipbuilding.

The forests of the Conestogo Watershed played a less important role in the local economy of the pioneer settlement than the mixedwood forests lying further south. These forests, which were predominantly hardwood, had little or no value as an export commodity and the distance from available markets further complicated the problem. The pine, tamarack and cedar which grew in the watershed were soon exhausted by local building requirements. Consequently there were fewer mills on the Conestogo than existed on Whiteman Creek.

CHAPTER 2

PRESENT WOODLAND CONDITION

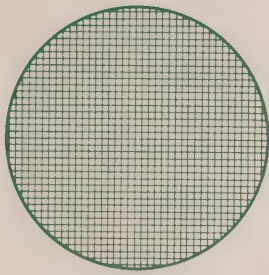
The tributary watersheds which are described in this report lie almost entirely within the Huron-Ontario Section of the Great Lakes - St. Lawrence Forest Region.* The boundary of this forest region passes through the southern portion of Whiteman Creek below which lies the Deciduous Forest Region.

The forests of the Huron-Ontario Section are characterized by a forest in which sugar maple and beech are the dominant species on well drained sites. With these species are white elm, basswood, white ash, some yellow birch, red and silver maple. Small groups of hemlock and white pine occur within the associations. A scattered distribution of large-tooth aspen, bitternut hickory, ironwood, black cherry and blue beech occur throughout the region. Black ash, white elm, red maple association and some white cedar are found on imperfectly drained areas, bottom land and swamps. Pioneer species such as aspen, pin cherry and hawthorn are common on cleared land which has been allowed to revert to tree cover or open scrub land.

The Deciduous Forest Region extends north through most of Burford and Oxford East Townships. This region enjoys a moderate climate caused by the proximity of Lake Erie. Though the forest in this region consists primarily of beech and sugar maple together with basswood, red maple, red, white and bur oak, a large number of other species, many of small size, find their northern limit here. Among these are sweet chestnut, tulip tree, pignut hickory; chinquapin, black and pin oaks; black gum, blue ash, magnolia, papaw, Kentucky coffee tree, red bud, red mulberry and sassafrass. In addition, within this region is the main distribution in Ontario of black walnut, sycamore, swamp white oak and shagbark hickory, together with the more widely distributed butternut and bitternut hickory, rock elm, silver maple and blue beech. Coniferous species are poorly represented

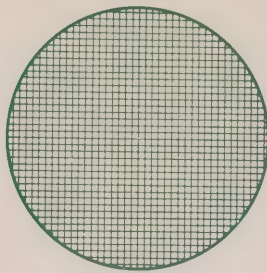
* W. E. D. Halliday. A Forest Classification for Canada, 1937.

CONESTOGO RIVER



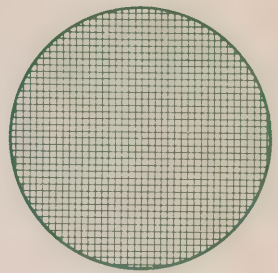
203,100 ACRES
(100 %)

IRVINE CREEK



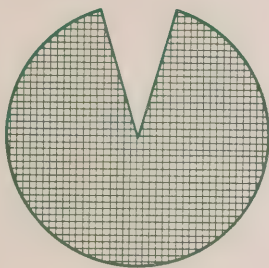
53,190 ACRES
(100 %)

WHITEMAN CREEK

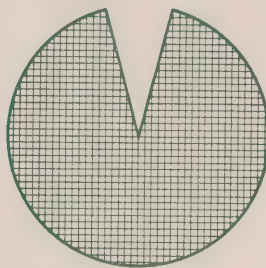


93,950 ACRES
(100 %)

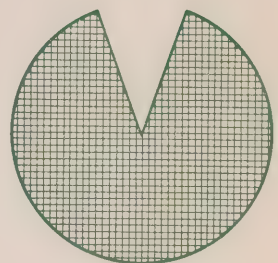
TOTAL AREA OF WATERSHED



184,919 ACRES
(91.1 %)



48,988 ACRES
(92.1 %)



83,873 ACRES
(89.4 %)

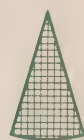
OPEN LAND



15,018 ACRES
(7.4 %)



3228 ACRES
(6.1 %)



8588 ACRES
(9.1 %)

WOODLAND



1891 ACRES
(0.9 %)



824 ACRES
(1.5 %)



1344 ACRES
(1.4 %)

WET SCRUB



1272 ACRES
(0.6 %)



150 ACRES
(0.3 %)



145 ACRES
(0.1 %)

DRY SCRUB

LAND CLASSIFICATION - TOTAL WATERSHED

in this forest region; however, stands of white pine were common on the Burford plain at the time of settlement.

1. Survey Methods

The field examination techniques which were adopted for the Nith and Speed surveys were continued on the Conestogo-Irvine and Whiteman areas. The forestry party mapped directly on aerial photographs on a scale of 1,000 feet to the inch. Each area of woodland, scrubland, marsh, swamp and rough land was visited and descriptions were made of acreage, cover type, presence of grazing and reproduction.

All woodlots were grouped according to the following classifications:

Diameter Breast High	Hardwood	Mixedwood	Coniferous
Virgin	H-1	M-1	C-1
Over 18 inches	H-2	M-2	C-2
10 Inches to 18 Inches	H-3	M-3	C-3
4 Inches to 10 Inches	H-4	M-4	C-4
Under 4 Inches	H-5	M-5	C-5

The term "hardwood" is used to denote all broad-leaved trees irrespective of their physical hardness. A hardwood type is one in which 80 per cent or more of the stand is composed of hardwood trees, a coniferous type is one in which 80 per cent of the stand is composed of coniferous trees and a mixedwood stand embraces all others. The forest cover types are listed in the Woodland Conditions by Townships table. The more common cover types have been illustrated in this chapter while the less common types have been combined in a separate description section for each watershed.

Where plantations were encountered, records were made of method of planting, approximate age, care, damage and survival.

Where land suitable for reforestation was encountered during the field examination, a preliminary report was prepared and more detailed studies were carried out at a later date (see Proposed Authority Forest section).

2. Forest Cover Types

A forest cover type is defined as being "a forest type now occupying the ground - no implication being conveyed as to whether it is temporary or permanent".^{*} A slightly modified form of the system drawn up by the Society of American Foresters has been used on this survey so that the system will adequately describe the cover types common to the watershed. The gaps in the numerical system are due to certain cover types, common to the eastern United States, which do not enter Canada.

The following cover types were encountered on the Conestogo, Irvine and Whiteman watersheds. This table indicates the type, number, the predominant species, cover type, abundance by the area it occupies and the total acreage of the type.

(See table on following page)

* Forest Cover Types of Eastern United States. Report of the Committee on Forest Types, Society of American Foresters. 1940.

Type Number	Predominant Species	Abundance by Area Occupied			Total Acre- age
		Conestogo	Irvine	Whiteman	
4	Aspen	2	1	2	5,161
4a	Poplar-oak			21	9
8	White pine-red oak- white ash			20	12
9	White pine			22	3
10	White pine-hemlock			18	21
11	Hemlock	8	9	9	251
12	Sugar maple-beech- yellow birch	15	8	13	84
13	Sugar maple- basswood	7	11	8	333
14	Sugar maple	1	5	6	3,833
14a	Black cherry	17	12		17
21	White spruce-paper birch-balsam fir		7		43
22	Balsam fir	10			86
23	Black spruce	13			26
24	White cedar	6	2	7	2,767
25	Tamarack	12		16	71
26	Black ash-white elm-red maple	4	3	5	3,555
45	Bur oak			15	36
49	White oak-black oak-red oak			12	46
50	White oak			19	18
51	Red oak-basswood- white ash			14	36
57	Beech-sugar maple	3	6	3	3,668
58	Beech	9		17	163
59	Ash-hickory	18	13	11	79
60	Silver maple- white elm	14		1	2,839
60a	White elm	5	4	4	3,530
88	Willow	16		10	86
Total					- 26,773

Type 4 Aspen is a pioneer species which often invades abandoned fields and pastures, slash and burned-over woodland. Its associates may be large-toothed aspen, balsam poplar, red cherry, white elm and paper birch. An understory of dogwood or spruce and balsam fir on wet sites or of tolerant hardwoods may occur on drier sites.

Type 4a Poplar - Oak This is a residual type which follows logging or fire on the lighter soils of the Whiteman Creek area. The oak usually consists of white, red and sometimes bur oak. The site is usually a white pine site and scattered trees of this species occur throughout the stands.

Type 8 White Pine - Red Oak - White Ash This type occurs with red maple as the most common associate, though other species which may be present include basswood, yellow birch, large-toothed aspen, sugar maple, beech, paper birch, black cherry and hemlock. The type distribution in the study areas is limited to the southern portion of Whiteman Creek.

Type 9 White Pine typically occurs on fresh, sandy loam upland; it also occurs on clay, in swampy areas and on loamy sand. The acreage of this type has always been limited throughout the Irvine and Conestogo watersheds; however, stands of this type were common to the Whiteman Creek Watershed.

Type 10 White Pine - Hemlock Many species are associated with this type but none are particularly characteristic. It occurs on a range of sites from sand plains to heavy upland soils, but favours cool locations such as the slopes of ravines. Its present distribution is limited to Whiteman Creek.

Type 11 Hemlock This type is scattered throughout the three watersheds on cool locations in ravines and on north slopes. Its associates are beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, white pine, paper birch and red oak.



To insure sustained yield some form of woodlot management is necessary. This stand is in need of a thinning to remove dead, diseased and crooked trees and excessive coppice growth.



Type 4: Aspen often invades abandoned fields, pastures and slash land. It occurs on a wide variety of sites from excessively drained to all but the wettest sites. It ranks second by area occupied and extends over 5,161 acres.



Type 24: White cedar occurs on a wide range of sites from muck soils to droughty upland slopes. There are 2,767 acres of this cover type on these areas.

Type 12 Sugar Maple - Beech - Yellow Birch This type occurs on well drained loam soils in association with most of the upland hardwoods.

Type 13 Sugar Maple - Basswood This is a fairly important type occurring on loamy, upland soils. Its associates are white elm, green ash, yellow birch, white pine and red oak with ironwood and blue beech as subordinates.

Type 14 Sugar Maple The original stands of this type covered a large proportion of the well drained soils in the Grand watersheds. Although a vast area has been cleared for agriculture it is still the most abundant cover type in the Conestogo Watershed. Hard maple is associated with yellow birch, white ash and basswood.

Type 14a Black Cherry This type usually occurs on fertile, moist, well drained soils as second-growth stands. Its associates may be sugar maple, red oak, red maple, white ash, white elm, basswood and hemlock.

Type 21 White Spruce - Balsam Fir - Paper Birch has an extremely limited distribution and is found only in cool swamp sites in association with aspen, white cedar and yellow birch.

Type 22 Balsam Fir Like Type 21 it is an intrusion from the northern forest and is limited to cool swamps in association with yellow birch, red maple, black spruce, tamarack, black ash and cedar.

Type 23 Black Spruce This type is an intrusion from the northern forests which is rarely found in the Whiteman-Conestogo areas. It occurs on swamp with little or no drainage in association with tamarack, white cedar, black ash, balsam fir, white elm and red maple.

Type 24 White Cedar The associates of this type are tamarack, yellow birch, paper birch, black ash, red maple, white pine and hemlock. It occurs on sites ranging from muck soils, bottom-land to upland soils. It is the most extensive conifer in these watersheds.

Type 25 Tamarack This type occurs on muck swamps with little or no drainage in association with white cedar and less commonly with red maple, black ash and aspen.

Type 26 Black Ash - White Elm - Red Maple This type is one of the most important swamp hardwood cover types encountered in these watersheds. Its associates are balsam poplar, yellow birch, white cedar, tamarack, silver maple, and sometimes white pine.

Type 45 Bur Oak This is an uncommon type which is limited to the southern portion of the Whiteman Creek, the associates of which are red oak, white oak or black oak. It occurs on loamy slopes with south or south-west exposure.

Type 49 White Oak - Black Oak - Red Oak This type belongs to the Deciduous Forest Region and occurs in the extreme southern portion of the Whiteman Creek Watershed. Associates are bur oak, shagbark or bitternut hickory, white or green ash, sugar maple and occasionally a few black cherry, butternut and large-tooth aspen.

Type 50 White Oak This type occurs on light soils in the southern portion of Whiteman Creek. Its associates are chiefly black oak and shagbark hickory.

Type 51 Red Oak - Basswood - White Ash Associated with the type species are red maple, yellow birch, aspen, sugar maple, paper birch and beech. This is a relatively unimportant type.

Type 57 Beech - Hard Maple The distribution of this type extends throughout the three watersheds and accounts for a large portion of the better drained woodlands. Red maple, white oak, hemlock, white elm, basswood, shagbark hickory and black cherry are chief associates.

Type 58 Beech This type is usually residual from a logging operation in which the hard maple component has been removed from a Type 57 stand. Theoretically this type is a climax forest type; however, it is almost invariably associated with sugar maple.



Type 60: White Elm — Silver Maple

This is one of the most common swamp hardwood cover types on the Conestogo-Irvine and Whiteman Watersheds. Varying mixtures of white elm, silver and red maple and black ash combine to form 9,903 acres of wet-site hardwoods.

Type 59 Ash - Hickory It is usually a residual type following cutting and grazing. It is usually composed of white or green ash and shagbark and bitternut hickory with bur oak, cottonwood, blue beech and ironwood as associates.

Type 60 Silver Maple - White Elm This is a type of poorly drained soils unsuitable for general farming unless completely and adequately underdrained. This is probably the reason why this type, along with Type 60a white elm, have survived better than cover types which are normally located on well drained soils. Associate species are red maple, red elm, cottonwood, white, red and green ash, bur oak and bitternut hickory.

Type 60a White Elm This type is similar to Type 60 but is found on drier sites as well as swamps and swales.

Type 88 Willow Several species are included in this type, the commonest being black willow. It occurs on the fringe of wet sites and along stream banks.

3. Conestogo-Irvine Watersheds

(a) Summary of Cover Types

The Irvine and Conestogo Rivers rise on the Dundalk Plain and throughout most of their course flow through wide valleys which were formed by the melting water of the glacier. The Conestogo Watershed extends through a gently undulating plain until it reaches the rolling lands of Wellesley and Woolwich Townships.

The woodlands of both watersheds can be divided into two broad groups which are related primarily to land drainage. The loam soils of the Dundalk Plain and the rolling lands in the southern portion of the watershed support hardwood stands while the imperfectly drained lands within the meltwater channels contain mostly swamp hardwoods and white cedar.

The general observations of cover type distribution on the Conestogo-Irvine area may be summarized as follows:

(1) Aspen cover type makes up 21.9 per cent of the woodland and is the most common type in the watersheds. It is

PERCENTAGE BY TOWNSHIP

ASPEN 4

PAPER BIRCH 61

HEMLOCK II

SUGAR MAPLE-BEECH-YELLOW BIRCH 12

E-BASSWOOD 13

SUGAR MAPLE 14

BLACK CHERRY 14a

BALSAM FIR 22

ACK SPRICE 23

WHITE CEDAR 24

TAMARACK 25

OLICK ASH - WHITE FILM - RED MARI E 26

RED OAK - BASSWOOD WHITE ACER

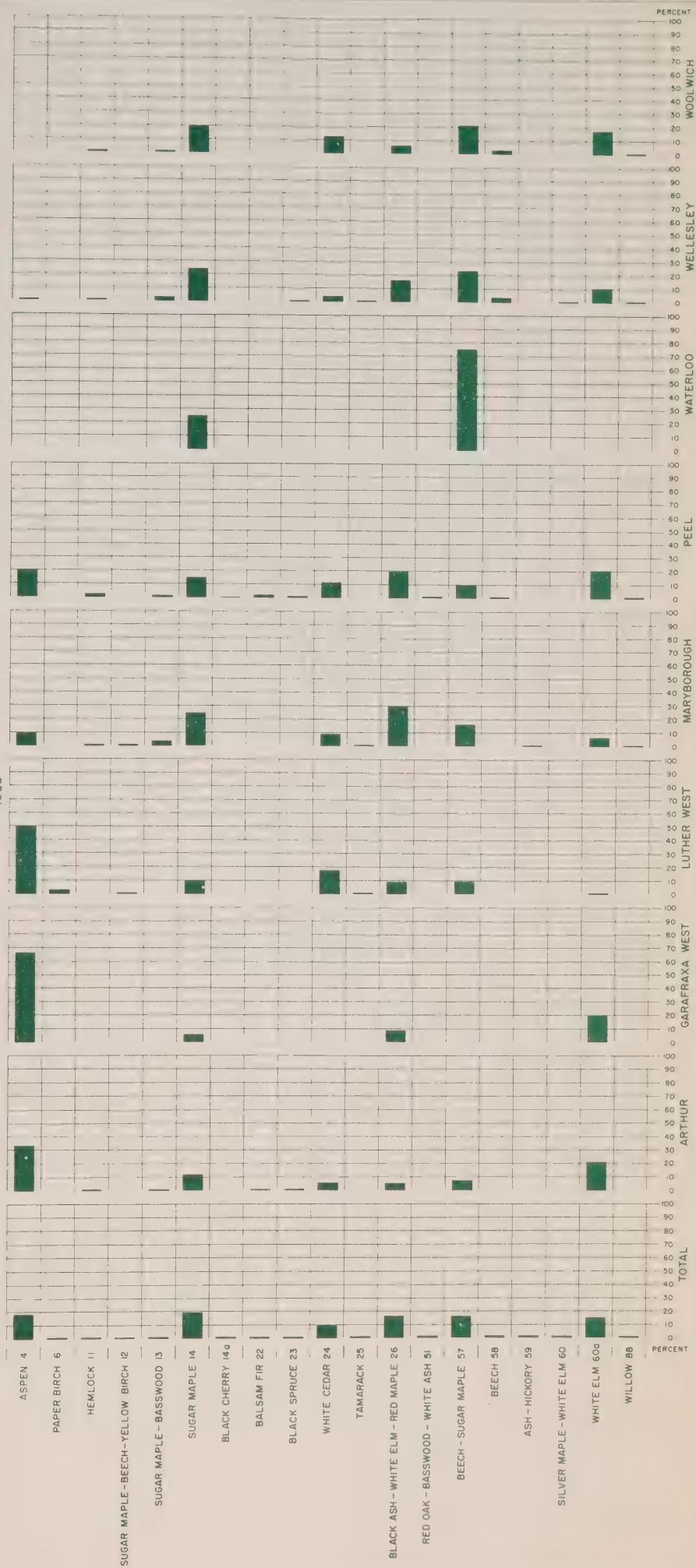
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FOREST COVER TYPES - CONESTOGO WATERSHED

Township	No. of Woodlots	No. of Acres	4	6	11	12	13	14	14a	22	23	24	25	26	51	57	58	59	60	60a	88
Arthur	213	2,010	701		14		6	459		18	7	137		103		143				422	
Garafraxa W.	17	296	196					16						25						59	
Luther W.	100	1,616	809	43			8	160				282	16	135		151				12	
Maryborough	290	3,131	272		4	10		773				276	9	960		517		6		214	3
Peel	359	3,716	758		75			557	7	68	8	332		725	4	375	2			762	3
Waterloo	2	48						14								34					
Wellesley	178	2,675	18		49			655			11	124	15	446		620	95		21	540	5
Woolwich	91	1,526			4			299				190		86		640	37			263	5
Total	1,250	15,018	2,754	43	146	18	211	2,933	7	86	26	1,341	40	2,480	4	2,480	134	6	21	2,272	16
Per Cent			18.4	0.3	0.9	0.1	1.4	19.6	--	0.6	0.2	8.9	0.3	16.5	--	16.5	0.9	--	0.1	15.2	0.1
Rank by Area Occupied			2	11	8	15	7	1	17	10	13	6	12	4	19	3	9	18	14	5	16

FOREST COVER TYPES - IRVINE WATERSHED

Township	No. of Woodlots	No. of Acres	4	6	11	12	13	14	14a	21	24	26	27	29	59	60a
Garafraxa E.	12	102	79					11				12				
Garafraxa W.	127	1,518	548		6			126		9	495	133	78			123
Luther E.	5	51	44					2					5			
Luther W.	43	694	376	14			13	83	3	34	45	34	56			36
Nichol	73	738	179		17	28		11	7		269	149	9			69
Peel	10	98	19					5			25		6	3		40
Pilkington	5	27									19	4	4			
Total	275	3,228	1,245	14	23	28	13	238	10	43	853	332	158	3		268
Per Cent		100	38.7	0.4	0.7	0.9	0.4	7.4	0.3	1.3	26.4	10.2	4.9	0.1		8.3
Rank by Area Occupied			1	10	9	8	11	5	12	7	2	3	6	13		4

distributed over a wide range of sites from excessively drained upland regions to all but the wettest areas. On the upland plain, aspen acts as a pioneer species, establishing itself mainly on small areas of farmland which have been abandoned due to imperfect drainage, stoniness or steep slopes. Along the meltwater channel the cover type is found on level, poorly drained areas of abandoned farmland.

(2) Wet-site cover types are very common on the watersheds. Excluding the aspen stands which occupy moist sites, the most common cover types are black ash - white elm - red maple, white elm type and white cedar. These stands account for 41.4 per cent of the woodland acreage. Their local distribution extends through the level imperfectly drained lands within the meltwater channel and in small imperfectly drained depressions on the plains area.

(3) Most of the woodland described in (1) and (2) are located on moist sites, thus approximately 63 per cent of the woodland on these watersheds may be classed as moist to wet site cover types. Due to the insufficient drainage of most of this area, it would appear unlikely that any major changes in land use will take place in these woodland areas.

(4) Sugar maple and beech - sugar maple cover types rank second and fourth respectively in the areas occupied by individual cover types which are represented in these watersheds. Collectively these stands occupy 32.6 per cent. These cover types originally covered most of the well drained areas of these watersheds; however, most of these stands were cleared for agriculture until only 4,809 acres of these types remain.

(b) Present Conditions

The results of the forestry surveys are summarized in accompanying tables.

The conifers occurring in the watershed are white cedar, white pine, white spruce, hemlock, balsam fir, tamarack and black spruce. White cedar stands occupy 12 per cent of the

PERCENTAGE BY TOWNSHIP
1953



WOODLAND CLASS - CONESTOGO WATERSHED

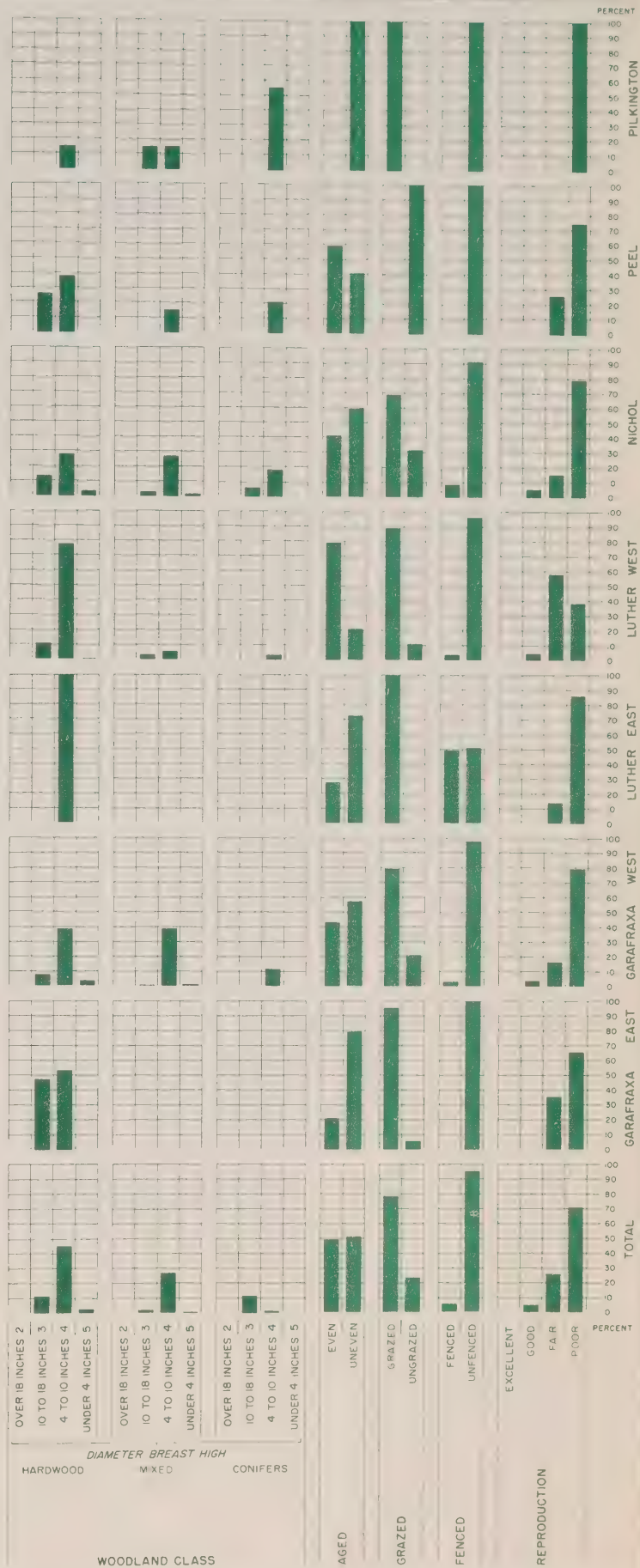
Township	No. of Woodlots	No. of Acres	C					H					M				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Arthur	213	2,010				83				18	1,465	3				441	
Garafraxa W.	17	296									296						
Luther W.	100	1,616				50	7			19	966	105				433	36
Maryborough	290	3,131			4	73	22		37	618	1,687	129			34	506	21
Peel	359	3,716				168				377	2,216	162			10	739	44
Waterloo	2	48									48						
wellesley	178	2,675		2	16	79	10		122	940	1,256	50		21	102	77	
Woolwich	91	1,526				102			97	751	442	6			33	95	
Total	1,250	15,018		2	20	555	39		256	2,723	8,376	455		21	179	2,291	101
Per Cent			--		0.1	3.7	0.2		1.7	18.2	55.8	3.0		0.1	1.2	15.3	0.7

WOODLAND CONDITION (ACRES) - CONESTOGO WATERSHED

Township	No. of Woodlots	Area	Aged		Grazed		Fenced		Reproduction			
			Even	Uneven	Yes	No	Yes	No	A	B	C	D
Arthur	213	2,010	880	1,130	1,455	555	331	1,679		47	304	1,659
Garafraxa W.	17	296	279	17	83	213	20	276		16		280
Luther W.	100	1,616	1,030	586	1,186	430	227	1,389		23	189	1,404
Maryborough	290	3,131	1,393	1,738	2,221	910	390	2,741		213	636	2,282
Peel	359	3,716	1,735	1,981	2,154	1,562	421	3,295		114	1,004	2,598
Waterloo	2	48		48		48	34	14		34		14
Wellesley	178	2,675	574	2,101	1,071	1,604	984	1,691		247	1,421	1,007
Woolwich	91	1,526	303	1,223	726	800	646	880		209	519	798
Total	1,250	15,018	6,194	8,824	8,896	6,122	3,053	11,965		903	4,093	10,042
Per Cent			41.2	58.8	59.2	40.8	20.7	79.3		6.0	27.1	66.9

WOODLAND CONDITIONS BY TOWNSHIPS

IRVINE CREEK
PERCENTAGE BY TOWNSHIP
1953



WOODLAND CLASS - IRVINE WATERSHED

Township	No. of Woodlots	No. of Acres	C					H					M				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Garafraxa E.	12	102								48	54						
Garafraxa W.	127	1,518			171					116	583	49			5	584	10
Luther E.	5	51									51						
Luther W.	43	694				22				74	535	2			23	38	
Nichol	73	738			43	132				98	205	29			20	199	12
Peel	10	98				20				26	37					15	
Pilkington	5	27				15					4				4	4	
Total	275	3,228			43	360				362	1,469	80			52	840	22
Per Cent					1.3	11.2				11.3	45.3	2.4			1.7	26.1	0.7
Total	275	3,228	403					1,911					914				
Per Cent			12.3					59.2					28.5				

WOODLAND CONDITION (ACRES) - IRVINE WATERSHED

Township	No. of Woodlots	Area	Aged		Grazed		Fenced		Reproduction			
			Even	Uneven	Yes	No	Yes	No	A	B	C	D
Garafraxa E.	12	102	21	81	97	5		102			36	66
Garafraxa W.	127	1,518	661	857	1,199	319	48	1,470		51	257	1,210
Luther E.	5	51	14	37	51		25	26			7	44
Luther W.	43	694	545	149	618	76	23	671		28	401	265
Nichol	73	738	296	442	503	235	63	675		39	111	588
Peel	10	98	58	40		98		98			26	72
Pilkington	5	27		27	27			27				27
Total	275	3,228	1,595	1,633	2,495	733	159	3,069		118	838	2,272
Per Cent			49.5	50.5	77.3	22.7	5.0	95.0		3.6	25.8	70.6

total woodland and this is the only common coniferous species in the watersheds. Small scattered stands of white pine are found through the watershed while hemlock is found mixed with the upland hardwoods. Black spruce, tamarack, balsam fir and cedar occupy the cooler swamps. Most of the coniferous stands have been depleted due to the need of softwood lumber by the early settlers and by recurrent fires. The woodlands of today contain 5.5 per cent coniferous cover, 19.3 mixedwood cover and 75.2 per cent hardwood cover; consequently the woodlands of these watersheds are predominantly hardwood.

In the 75.2 per cent classified as hardwood, 1.4 per cent is over 18 inches, diameter breast height; 16.9 per cent is 10 to 18 inches; 54.0 per cent is 4 to 10 inches; and 2.9 per cent is young growth under 4 inches in diameter. In the mixedwood classes, comprising 19.3 per cent of the woodland, 0.1 per cent is over 18 inches diameter; 1.3 is 10 inches to 18 inches; 17.2 per cent is 4 inches to 10 inches; and 0.7 per cent is under 4 inches diameter. In the coniferous stands which comprise 5.5 per cent of woodland, 0.3 per cent is 10 to 18 inches diameter; 5.0 per cent is 4 to 10 inches; and 0.2 per cent is under 4 inches diameter breast height. These data indicate that mature and over-mature stands on the basis of trees measuring 18 inches, diameter breast height, and greater represent only 1.8 per cent of the woodland, while 76.2 per cent of the woodland falls into the 4-inch to 10-inch diameter class.

The woodlot survey on these watersheds included the inventory of forest cover types, general age distribution, fencing and pasturing of the woodlot and the amount of natural regeneration in the stand. The survey indicates that 57.3 per cent of the woodlots are uneven-aged stands. The percentage of farm woodlots which are grazed is average in comparison with other watersheds. There are many severely grazed woodlots on both watersheds.

At present, there are virtually no woodlots on either watershed which can be classed as fully stocked with natural reproduction; 32.5 per cent require some re-stocking and 67.5 per cent of the woodlots are virtually devoid of regeneration. The practice of grazing farm woodlots is the most important factor in the extremely low percentage on woodlots which have sufficient young growth.

4. Whiteman Creek Watershed

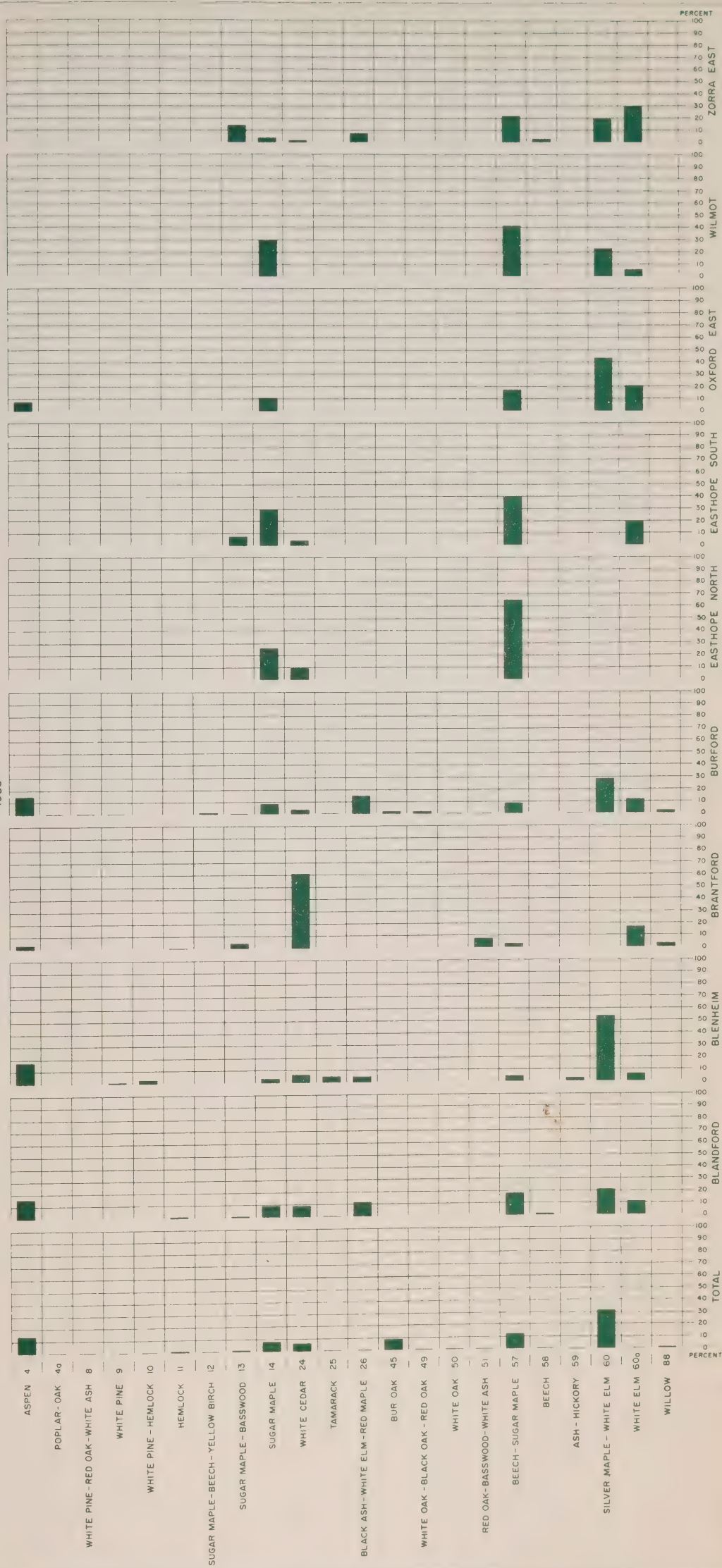
(a) Summary of Cover Types

Horner Creek, which is the main tributary of Whiteman Creek, rises on a till plain and flows in a south-easterly direction. Through a system of glacial spillways, the creek flows onto a sand plain where it joins Whiteman Creek two miles east of the village of Cathcart. Kenny Creek rises on a till plain and flows in an easterly direction until it joins Whiteman Creek near the confluence of Whiteman and Horner Creek.

The watershed lies astride a forest region boundary, so that a marked variation of tree species and forest cover types occurs in the southern portion of the area. The forest cover in the northern portion of the watershed is similar to the woodlands of the Conestogo and Nith Watersheds, which are predominantly hardwood. The woodlands pass through a transition zone adjoining Highway No. 2 which develops into the Deciduous Forest Region in the southern portion of Burford Township.

The general observations of cover type distribution may be summarized as follows:

(1) The most extensive forest cover type on Whiteman Creek is Type 60, silver maple - white elm, which accounts for 32.7 per cent of the woodlands on the watershed. This type along with pure white elm stands makes up 44.3 per cent of 3,808 acres of woodland. It is

PERCENTAGE BY TOWNSHIP
1953

FOREST COVER TYPES - WHITEMAN WATERSHED

Township	No. of Woodlots	No. of Acres	4	4a	8	9	10	11	12	13	14	24	25	26	45	49	50	51	57	58	59	60	60a	88	W.S.	D.S.
Blandford	147	1,622	259					17		8	156	156	8	187					290	18		346	177		382	32
Blenheim	164	2,500	432				21	62			73	148	17	123					121		51	1,323	129		344	16
Brantford	27	273	8					3		11		167						21	7			47	9			
Burford	210	2,796	414	9	12	3			38	19	245	82	6	406	36	46	18	15	251		19	785	331	61	487	58
Easthope N.	5	54									14	5							35							6
Easthope S.	19	256								18	75	9							103				51		14	
Oxford	54	628	49								65								109			272	133		117	33
Wilmot	9	73									22								30			17	4			
Zorra E.	43	386								53	12	6		27					84	11		75	118			
Total	678	8,588	1,162	9	12	3	21	82	38	109	662	573	31	743	36	46	18	36	1,030	29	70	2,818	990	70	1,344	145
Per Cent	100	100	13.6	.1	.1	0	.2	1.0	.4	1.3	7.7	6.8	.4	8.7	.4	.5	.2	.4	12.0	.3	.8	32.8	11.6	.8		
Rank by Area Occupied			2	21	20	22	18	9	13	8	6	7	16	5	15	12	19	14	3	17	11	1	4	10		

distributed throughout the area on moist sites, in depressions, and adjoining river banks.

(2) Wet-site species form the most common cover on the watershed. The more common examples are silver maple - white elm, white elm, aspen, white cedar, tamarack and black ash - white elm - red maple. Due to imperfect drainage on these sites, the areas have been either rejected for agricultural development or abandoned because of the high cost of drainage which would be required if agricultural crops were to be grown. From these conditions it would appear that no major change in its present forest land use can be forecast. As the wet-site species occupy 6,317 acres or 73.6 per cent of the total woodland, the bulk of forest land in the watershed is not liable to any drastic change in land use.

(3) The upland or dry-site cover types, such as sugar maple and beech - sugar maple, occupy a smaller percentage of the total watershed than other tributary watersheds which have been studied on the Grand system. All woodlands, exclusive of wet-site types, total 2,271 acres, which includes the oak associations, pine - oak and dry-site hardwood, the only common type being beech - hard maple which occupies 1,030 acres.

(b) Present Conditions

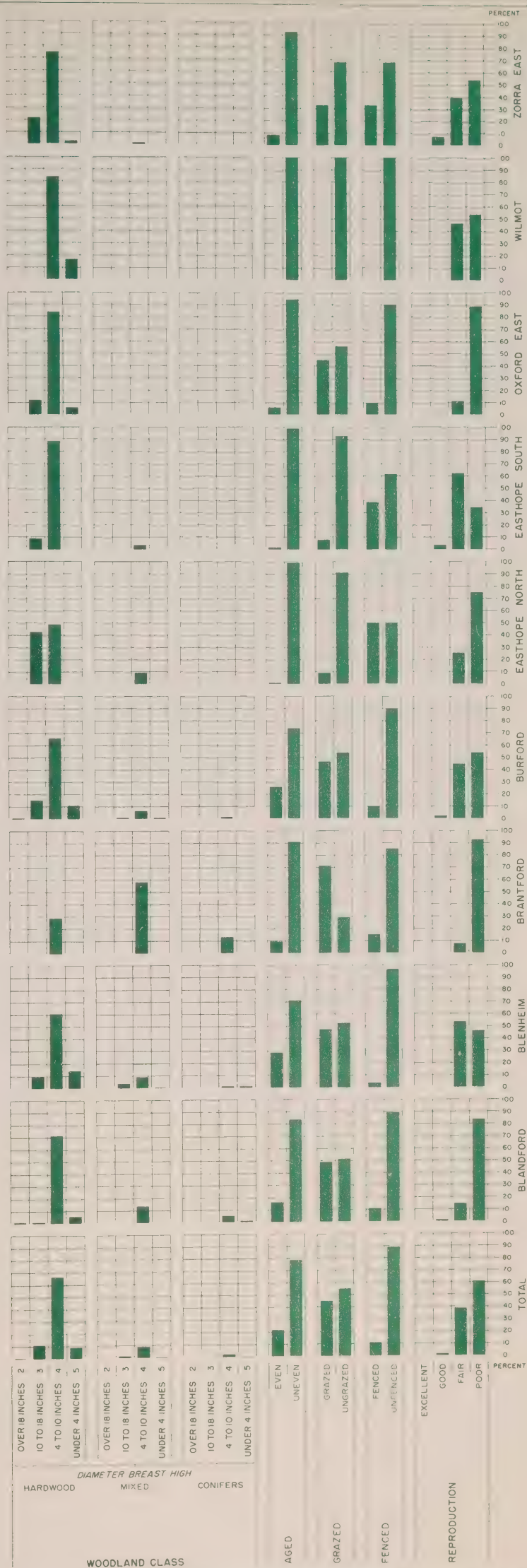
The field data collected during the forestry survey have been summarized in the accompanying tables and graphs.

The conifers occurring in the valley are white pine, hemlock, white cedar and tamarack. Red pine probably occurred in the original forest; however, no trees were found in the natural state at the time the survey was made. White pine is scattered along the valleys of the streams. Hemlock is found mixed with hardwoods, and white cedar and tamarack are present in the small swamps. There is no doubt that conifers formed a larger part of the woodland than they do today, but their numbers have been diminished because of the desirability

WHITEMAN CREEK

PERCENTAGE BY TOWNSHIP

1953



WOODLAND CLASS - WHITEMAN WATERSHED

Township	No. of Woodlots	No. of Acres	H					M					C				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Blandford	147	1,622		10	98	1,155	46				224					81	8
Blenheim	164	2,500			244	1,521	336			93	223	19				29	35
Brantford	27	273				78					158					37	
Burford	210	2,796		9	428	1,841	282			12	185	11				28	
Easthope N.	5	54			23	26					5						
Easthope S.	19	256			21	226					9						
Oxford E.	54	628			75	520	33										
Wilmot	9	73				61	12										
Zorra E.	43	386			83	288	9				6						
Total	678	8,588		19	972	5,716	718			105	810	30				175	43
Per Cent	100	100		0.2	11.2	66.6	8.4			1.2	9.4	0.4				2.1	0.5

WOODLAND CONDITION (ACRES) - WHITEMAN WATERSHED

Township	No. of Woodlots	Area	Aged		Grazed		Fenced		Reproduction			
			Even	Uneven	Yes	No	Yes	No	A	B	C	D
Blandford	147	1,622	270	1,352	778	844	167	1,455		27	234	1,361
Blenheim	164	2,500	704	1,796	1,183	1,317	83	2,417			1,338	1,162
Brantford	27	273	26	247	195	78	41	232			19	254
Burford	210	2,796	736	2,060	1,300	1,496	278	2,518		56	1,249	1,491
Easthope N.	5	54		54	5	49	27	27			41	13
Easthope S.	19	256	3	253	20	236	98	158		9	159	88
Oxford E.	54	628	41	587	280	348	64	564		4	70	554
Wilmot	9	73		73		73		73			34	39
Zorra E.	43	386	30	356	126	260	128	258		26	154	206
Total	678	8,588	1,810	6,778	3,887	4,701	886	7,702		122	3,298	5,168
Per Cent	100	100	21.2	78.8	45.4	54.6	10.3	89.7		1.4	38.3	60.3

of the lumber they furnished and recurrent fires have destroyed them while more fire-resistant species, such as oak, have survived. The situation at the present time is that of the 8,588 acres of woodland, 86.4 per cent is classified as pure hardwoods, 11.0 per cent as mixedwood and 2.6 per cent as pure conifers. In the 86 per cent classified as hardwoods, 0.2 per cent is over 18 inches in diameter breast height, 11.2 per cent is 10 to 18 inches, 66.6 per cent is 4 to 10 inches, and 8.4 per cent is young growth under 4 inches in diameter at breast height.

In the mixedwood classes, comprising 11 per cent of the woodland, 1.2 per cent is 10 to 18 inches in diameter, 9.4 per cent is 4 to 10 inches, and 0.4 per cent is under 4 inches diameter. In the coniferous woods, 2.1 is classed as 4 to 10 inches diameter and 0.5 per cent is under 4 inches diameter at breast height.

For the entire area the percentage of uneven-aged stands is much greater than for even-aged, the figures being 78.8 uneven and 21.2 per cent even-aged.

Grazing in farm woodlots is still fairly general. The percentage of grazed woodland is 45.4 per cent, which is somewhat higher than other tributary watersheds in the Grand Valley. Due to the custom of grazing in the woodlots, some stands have become open and require some planting. Of the woodlots examined, 60.3 per cent are virtually devoid of natural regeneration and 39.7 per cent require some planting to bring them back to fully stocked stands.

CHAPTER 3

CONSERVATION MEASURES IN PROGRESS

The lands drained by the Irvine, Conestogo and Whiteman Creek are generally unsuited for any large-scale tree-planting programs. In the past, reforestation in these watersheds has been largely limited to several county tracts, especially in the Conestogo area where relatively high land values preclude large plantations. During the past forty years, numerous small plantations have been established on the sandy soils in the Whiteman Creek area. However, since the production of tobacco has increased in this area in the last twenty-five years, a large portion of the area, which normally would have been acquired for reforestation, has been converted into tobacco farms.

1. Private Planting

There are 110 plantations within the three watersheds, of which 97 are privately owned. The private plantations cover an acreage of 488 acres out of the total area of 713 acres. In comparison with other tributary watersheds in the Grand Valley, the established areas of reforestation on the Conestogo and Irvine contain an average amount of plantation area. The Whiteman Creek Watershed contains a larger acreage of reforestation than similar areas within the Grand Valley due to the relatively large areas of sandy soils which occur throughout the central portion of the watershed. The proximity of St. Williams nursery to the Whiteman Watershed has undoubtedly encouraged reforestation in the area.

2. County Forests

The Conestogo-Irvine area extends into three counties. Both rivers rise in Wellington County and flow in a generally southerly direction into the Grand River. Except for the southern portion of the Conestogo Watershed which lies in Waterloo County and a small portion of the Irvine Creek



This windbreak has been established by the Department of Highways to control snow drifting on Highway No. 9. Weeds have been mowed to remove competition.

This plantation has been thinned and pruned so that the maximum growth of knot-free sawlogs will be produced.



This illustration shows cordwood stacked at the edge of the plantation. This wood was derived from a thinning operation. Similar operations can provide a crop of posts, poles, pulpwood and fuelwood which can help to defray the cost of planting and maintenance.

PRIVATE PLANTATIONS

Watershed	Township	No. of Planta- tions	Total Area in Acres
Conestogo	Arthur	2	4
	Luther West	6	35
	Maryborough	7	21
	Peel	3	12
	Wellesley	9	45
	Woolwich	3	14
Watershed Total		30	131 ac.
Irvine	Garafraxa West	2	2
	Luther West	1	3
	Nichol	4	22
Watershed Total		7	27 ac.
Whiteman	Blandford	26	118
	Blenheim	13	71
	Brant	4	50
	Burford	15	79
	Easthope South	1	6
	Oxford East	1	6
Watershed Total		60	330 ac.
TOTAL		97	488 ac.

Assuming a six feet by six feet spacing on the 488 acres of plantation, 590,500 seedlings were required to plant these areas.

Watershed which lies in Dufferin County, the watersheds lie mostly in Wellington County. Of these three counties, Waterloo and Wellington both maintain county plantations within the watershed boundary.

The County of Waterloo established the Macton Tract in Waterloo Township in 1945. This 50-acre tract was planted in 1946 with white, jack and Scotch pine and white spruce. The plantation was spot planted in 1947, 1951-52-53 to replace stock which had failed or had been damaged by mice.

The Linwood Shelterbelt is a tract of land 12 rods wide which lies to the west of the Linwood road, extending with a few breaks from the Crosshill road, north beside the Linwood Road to Highway No. 86. Waterloo County has purchased this land as a demonstration shelterbelt. The first planting on this project was done in 1946, and refills have been periodically needed since, especially as a result of heavy mouse damage in 1951-52. The main species which were used in the shelterbelt were spruce, Scotch pine and some cedar.

Wellington County has established five county tracts within the watershed boundary. These consist of the Rich, Mulhall, McNamara and Glen Allan Tracts on the Conestogo Watershed and the Cumnock Tract on the Irvine Creek Watershed.

The Rich Tract in Peel Township contains 200 acres which is mainly lowland bush and willow scrub. There are 12 acres of open land which has been reforested.

The McNamara Tract in West Luther Township contains 100 acres. Sixty acres of open land were reforested in 1951. The remaining 40 acres are in second-growth aspen and willow scrub.

The Mulhall Tract adjoins the McNamara Tract and also contains 100 acres. This tract contains 40 acres of open land which was reforested in 1952 and 1953 and 60 acres of second-growth aspen and willow scrub.

The Glen Allan Tract in Maryborough Township lies across the height of land between the Nith and Conestogo

Watersheds. This 100-acre property was acquired in 1948. Attempts to reforest this tract have been unsuccessful due to mouse damage, frost heaving and very heavy weed growth.

Whiteman Creek extends into four counties: these include Brant, Oxford, Perth and Waterloo. Of these four counties only Oxford has established county plantations within the boundary of this watershed.

The Chesney Tract in Blandford Township was purchased in two 50-acre lots in 1944. Approximately 55 acres are under a natural cover ranging from willow scrub to good second-growth hard maple. The original planting program commenced in 1944 with the assistance of the Oxford Fish and Game Protective Association. Further planting programs were carried out in 1945 and -46 at which time the growing stock consisted of 65,800 white, jack and Scotch pine, white ash, red maple, white elm, walnut, white spruce and red oak. In 1947 fireguards were established and in 1948 a sample plot for demonstration in thinning second-growth maple was established.

The Creditville Tract in East Oxford Township comprises 50 acres. Ten acres of the tract is in woodlot and the remaining 40 acres of open land has been reforested. In 1946, 20 acres of red and white pine were planted and in 1947 the remainder of the tract was planted with white and red pine, European larch, white spruces, walnut and white ash.

3. Authority Forest

The Grand Valley Conservation Authority has established two forest tracts in the Conestogo-Irvine-Whiteman areas, the McGrorey Tract in the Conestogo Watershed and the Hossack Tract on Whiteman Creek.

The Hossack Tract comprises 98 acres in the S $\frac{1}{2}$, Lot 5, Concession I of Blandford Township. The area includes 15 acres of swamp, 10 acres of scrubland, 20 acres of excellent hardwood and 45 acres of moderately productive second-growth hardwood. The remaining 8 acres of open land was reforested with white, red and Scotch pine and white spruce.

The McGrorey Tract in Concession I, W $\frac{1}{2}$ Lot 31 of West Garafraxa Township contains approximately 80 acres. The tract is covered by a lowland second-growth bush.

PUBLICLY OWNED FOREST LAND IN THE
CONESTOGO-IRVINE-WHITEMAN WATERSHEDS

Forest	Watershed	Tract	Township	Con.	Lot	Acres
Conser- vation Authority	Conestogo	McGrorey	West Gara- fraxa	I	W $\frac{1}{2}$ 31	80
	Whiteman	Hossack	Blandford	I	S $\frac{1}{2}$ 5	98
Wellington County Forest	Conestogo	Rich	Peel	XVII	18	200
		McNamara	West Luther	IV	S $\frac{1}{2}$ 9	100
		Mulhall	West Luther	IV	N $\frac{1}{2}$ 9	100
		Glen Allan	Mary- borough	II	W $\frac{1}{2}$ 16	100
	Irvine	Cumnock	Nichol	XV-XVI	1	100
Waterloo County Forest	Conestogo	Macton	Wellesley	XIV	E 9	50
		Linwood Shelter- belt	Wellesley			
Oxford	Whiteman	Chesney	Blandford	IX	5	100
		Credit- ville	Oxford East	I	1	50
TOTAL						978

CHAPTER 4

FOREST CONSERVATION MEASURES REQUIRED

The field examination of the Conestogo, Irvine and Whiteman Watersheds indicates that the amount of reforestation land is limited in these areas. There are no large tracts of marginal or sub-marginal land within these watersheds and where smaller tracts of reforestation land have been located the assessed value precludes its purchase at the present time. The forestry cover type map which accompanies this report indicates a limited number of properties which should be reforested. Although it is doubtful if any of these properties can be acquired at the present time, it may be possible to acquire certain parcels of land in these watersheds when market value of these properties declines.

1. Recommended Authority Forest

The descriptions of the properties which have been proposed for Authority forest have been divided into descriptive units based on the watershed in which the property is located. The total area recommended for reforestation is 1,105 acres which includes 257 acres of woodland, 278 acres of scrubland and 570 acres of open land.

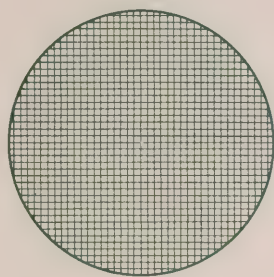
PROPOSED AUTHORITY FOREST

Watershed	Township	Acreage			
		Woodland	Scrubland	Open Land	Total
Conestogo	Maryborough	14	20	116	150
	Peel	13		109	122
	Wellesley	81	134	65	280
Irvine	West Luther	106	47	147	300
Whiteman	Blenheim	43	77	133	253
Total		257	278	570	1,105

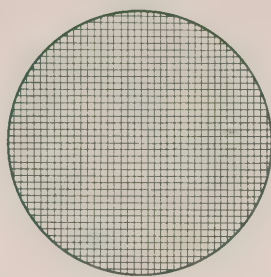
CONESTOGO
RIVER

IRVINE
CREEK

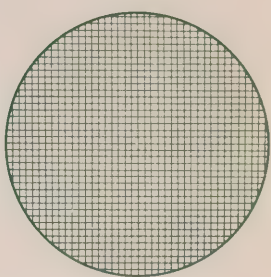
WHITEMAN
CREEK



552 ACRES
(100%)

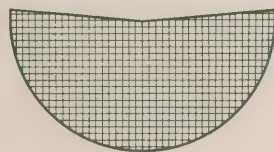


300 ACRES
(100%)

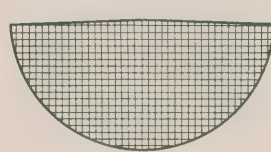


253 ACRES
(100%)

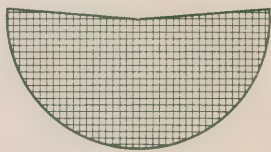
TOTAL AREA
OF
RECOMMENDED AUTHORITY FOREST



290 ACRES
(52.6%)

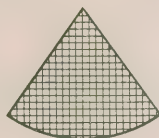


147 ACRES
(49.0%)

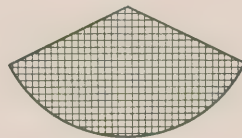


133 ACRES
(52.6%)

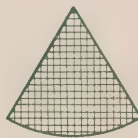
OPEN LAND



108 ACRES
(19.5%)

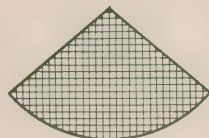


106 ACRES
(35.5%)

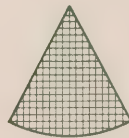


43 ACRES
(17.0%)

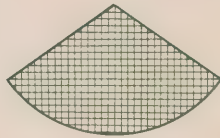
WOODLAND



154 ACRES
(27.9%)



47 ACRES
(15.5%)



77 ACRES
(30.4%)

SCRUB LAND

LAND CLASSIFICATION

RECOMMENDED AUTHORITY FOREST

(1) Conestogo

The land recommended for reforestation in the Conestogo Watershed is contained within five widely separated properties. These areas have been selected because of their low ability to produce any other agricultural crop. In general the properties are too rough and rolling for cultivation, consequently a large proportion of the farms have been used as rough pasture or allowed to revert to scrub growth. Of the total acreage of 552 acres recommended for reforestation in the Conestogo, 154 acres are covered in scrub growth; the remaining land contains 108 acres of woodland and 290 acres of open land which is mostly poor pasture. Much larger acreages of land which is suitable for reforestation exist in the Conestogo Watershed, but their assessed values exclude them from consideration at the present time. These areas are generally located in the rolling lands in Wellesley and Woolwich Township and in imperfectly drained areas within the glacial meltwater channels which now conduct the Conestogo River throughout most of its course.

(2) Irvine

The 300-acre tract which has been recommended for reforestation in the Irvine Watershed is located at the headwaters of one of the main tributaries of Irvine Creek. The land is generally rolling terrain which contains numerous springs. The 106 acres of woodland contained in these tracts vary from vigorous stands of second-growth maple - beech on the well drained upland sites to white cedar, white and yellow birch and balsam fir on the moister sites. The area also contains 147 acres of open land and 47 acres of scrubland.

(3) Whiteman

The development of a reforestation program for the Whiteman Creek area has been complicated by tobacco farming. The sandy soils, which normally would have been suitable for reforestation, are being cultivated for tobacco. The only remaining lands which could be considered for forest plantations are the imperfectly drained sites and very rough land. Five

IRVINE CREEK WATERSHED (GRAND RIVER SYSTEM) SHOWING AREAS RECOMMENDED FOR AUTHORITY FOREST, AREAS FOR PRIVATE REFORESTATION AND EXISTING WOODLAND

LEGEND

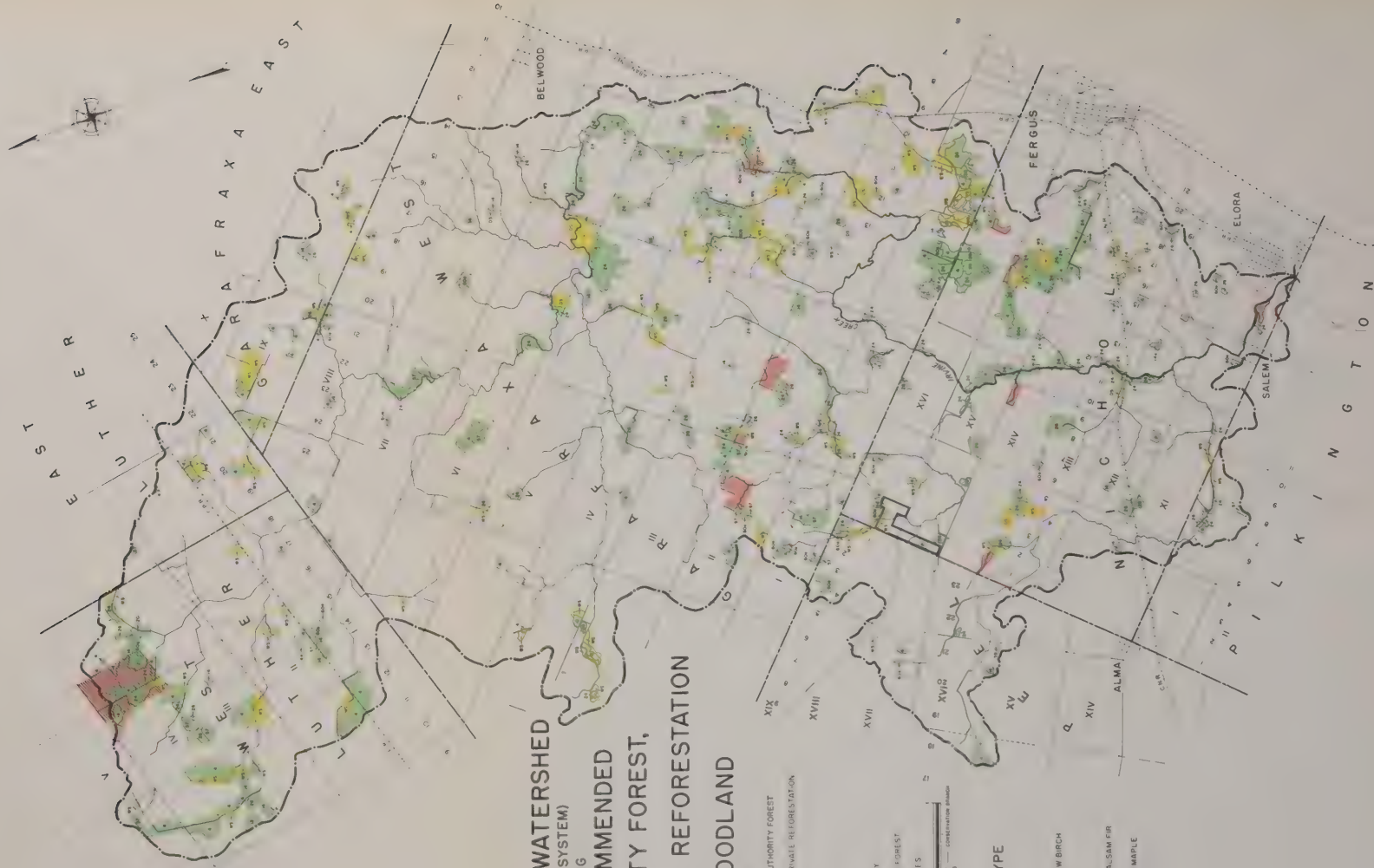
- RECOMMENDED FOR AUTHORITY FOREST
- RECOMMENDED FOR PRIVATE REFORESTATION
- EXISTING WOODLAND
- SCRUB LAND
- WETLAND
- WATERSHED BOUNDARY
- WATERSHED SUBDIVISION

SCALE: METERS

0 100 200 300 400 500 600 700 800 900 1000

FOREST COVER TYPE

- 4 ASPEN
- 6 PAPER BIRCH
- 11 HEMLOCK
- 12 SUGAR MAPLE - BEECH-YELLOW BIRCH
- 13 SUGAR MAPLE - BASSWOOD
- 14 SUGAR MAPLE - WHITE PINE
- 15 BLACK PINE
- 20 PAPER BIRCH - RED SPRUCE - BALSA M FIR
- 24 WHITE CEDAR
- 26 BLACK ASH - WHITE ELM - RED MAPLE
- 57 BEECH-SUGAR MAPLE
- 59 ASH-HICKORY
- 60a WHITE ELM



properties of this kind have been recommended for acquisition. These areas are situated in Blenheim Township and have a total area of 253 acres. This area is comprised of 133 acres of open land, 77 acres of scrub growth and 43 acres of woodland. The properties are mostly rolling pasture land with large areas of low, poorly drained sandy soils.

2. Land Acquisition

The problem of land acquisition in any part of agricultural Ontario, where practically all the land is privately owned, is one which requires careful approach. The ownership and use of land, especially for agricultural purposes, is considered by most citizens as one of their few remaining inalienable rights. However, where the good of the whole community is under consideration, such personal rights should be, and have been, overruled under the principle of eminent domain. Examples of such cases are the building of highways, the construction of power lines, and the acquiring of land for military purposes in the event of a national emergency.

In Southern Ontario compulsion has not been exercised to any great extent by the Government in planning proper land use schemes. But who would gainsay the fact that the acquiring of poor land on the Conestogo, Irvine and Whiteman Creek Watersheds for conservation purposes constitutes a national emergency, and therefore requires a more permanent authority than the individual to bring it back to its proper use.

However, in dealing with land acquisition it should not be the desire of any authority to approach the problem in a dictatorial manner. It will require careful handling, and as a preliminary step in such work the people of the area should be acquainted with the purpose of the scheme, its ultimate benefits to the community, and by explanation and demonstration be gradually brought to the point where they will be glad to co-operate.

The only part of the Conestogo, Irvine and Whiteman Creek Watersheds where large-scale transfers of property from private ownership to a forest authority would have to be made is in those areas which are recommended for acquisition because they are natural water storage areas and reforestation land.

(a) Methods of Acquiring Land

There are several ways in which land can be acquired and controlled for conservation purposes, and it is proposed to enumerate and discuss these briefly in this section.

(1) Transfer by Private Sale

The most satisfactory method of acquiring land is by private sale between the Conservation Authority concerned and the landowner. This method has been followed by the counties of Ontario in purchasing land for reforestation work in building up the system of county forests, which totals in round figures 90,000 acres. This method has its drawbacks, however, as individuals who have not the community's welfare at heart, or for one reason or another have an exaggerated idea of the value of their property, may block the completion of a unified area by refusing to sell. This was overcome in the State of New York, which has purchased over 450,000 acres of land for reforestation, by refusing to buy individual parcels of land unless there was a sufficient number in a group to make a contiguous block of 500 acres.

(2) Maximum Price per Acre

Another method which has been used has been to fix a maximum price per acre for this class of land, beyond which the forest authority is prohibited to go, allowance being made for the presence of good fencing and buildings on the properties, which in some cases have been removed by the vendors and allowed as part payment for the land.

(3) Agreements

Where owners of property prefer to retain their woodlots, or where parts of farms fall within the forest area

prescribed, and providing the retaining of ownership does not jeopardize the complete conservation scheme, agreements could be made for the control and management of such areas.

This method has been adopted by the Dominion Forest Service in Nova Scotia, where it has been desirable to control wooded areas for experimental and conservation schemes, and in this particular case the agreements cover a period of twenty years.

In Ontario there is one example, at least, where a municipality leased a part of a farm for reforestation work for fifty years, and one United Counties' council has adopted the plan of taking easements on land for the same purpose.

(4) Control by Existing Legislation

Under the authority of The Private Forest Reserves Act (R.S.O. 1950, Chapter 288), the Minister of Lands and Forests, on recommendation to the Lieutenant-Governor in Council, may, with the consent of the owner of any land covered with forest or suitable for reforestation, declare such an area to be a private forest reserve. When such an arrangement is made the Minister or his representative may reforest such areas, supervise the improving and cutting, and prohibit the removal of trees by the owner without his consent, and also prohibit the grazing of the area by cattle.

(5) Life Lease

Many of the farms on the proposed forest, as already mentioned, are of low agricultural worth and are supporting families at the present time. The problem in such cases is not so much the purchase of the property as what will become of the family after the farm is acquired. In almost every case it would be impossible for the vendor to purchase another farm with the money he receives, except one which is of approximately the same value outside the forest. In some cases such farms are occupied by older people whose families have grown up and left the community. The removal of these

from their properties might work undue hardship on them, and in fact in some cases they might become a burden on the municipality. With some of these the plan of giving the vendor a life lease would be sufficient. In most cases such old people make little attempt at farming the whole property, but require only sufficient pasture for a cow or two, enough land for a garden, the house and buildings, and a supply of fuelwood. The plan of giving a life lease has been adopted in the case of two properties,* at least, on the county forests in Ontario, and has proved satisfactory to both contracting parties.

(6) Tax Delinquent Land

Under the Statutes of the Province of Ontario,† land which becomes tax delinquent is sold by the County Treasurer. In the case of a farm this is not done in practice until the land has been in default for three, or in some cases four, years. Even then the owner has the privilege of redeeming his property within a year. Where such lands are marginal or submarginal, they are sometimes bought for only a part of the area which is of special value, such as woodland, old buildings, or a good field or two. In some instances the poor land remains idle and frequently appears again at the tax sale. The fact that such land becomes tax delinquent is an indication in many cases that its ultimate use is forestry. Under the present Statutes the municipalities are not permitted, at the first sale at least, to acquire or reserve such land for conservation purposes. Consequently this report recommends that the Authority expropriate all tax delinquent land subject to the regulations of the Municipal Act.

(7) Expropriation

As a last resort in land purchases, or where the owners of abandoned land cannot be located, such areas can be acquired by expropriation. The Conservation Authorities

* Northumberland Forest and Angus Forest.

† The Assessment Act, R.S.O. 1950, c. 24, s. 143

Act, R.S.O. 1950, Chapter 62, Section 15 states:

"For the purpose of carrying out a scheme an authority shall have the power to purchase or acquire, and without the consent of the owner enter upon, take and expropriate any land which it may require and sell or otherwise deal with such land or other property".

Also under The Forestry Act (R.S.O. 1950, Chapter 147, Section 13) provision is made for the removal of settlers from lands unsuitable for farming. To quote:

"Whenever in the opinion of the Minister, it is found that settlement has taken place on lands not suitable for agricultural purposes, and which said lands are required for forestry purposes, the Minister shall have the power to make arrangements for the removal of such settlers upon such terms as may be agreed upon".

As a matter of general interest, it should be stated that this Act also provides for the power to close the roads on lands taken over for forestry purposes, the setting apart of lands for settlement, and the removing of settlers from lands unsuitable for farming. It should also include, however, provision for acquiring permanent or community pastures, and pondage areas where these are required, as an integral part of a large conservation project.

(b) Cost of Land in the Proposed Authority Forest

It would be impossible to give an accurate figure for the total purchase price of all land in the proposed forest without consulting the owners of the individual parcels. However, as an indication for arriving at the approximate cost the amounts paid by the several Conservation Authorities of the Province in purchasing land for their forests will serve as a guide.

TABLE SHOWING COSTS OF LAND PURCHASED FOR AUTHORITY FORESTS

Name of Authority Forest	Acres	Cost \$	Cost per Acre \$
Ausable	1,209	26,030.00	21.50
Ganaraska	6,360	78,766.45	12.40
Grand	1,245	17,118.16	13.75
Humber	709	22,000.00	31.00
Moirs	1,314	7,805.00	5.95
Saugeen	2,026	9,196.00	4.55
Thames	2,525	14,059.14	5.70
Total	15,388	174,974.75	11.35

It should be pointed out that prices paid within the individual watersheds have varied greatly. The first three thousand acres purchased by the Ganaraska Authority averaged \$6.78 per acre. Land purchases now average \$12.40 per acre over the 6,360 acres which are now owned by the Authority. This average price increase was due to the policy of purchasing the poorer, denuded land first. This land has now been taken up and the more recent purchases have contained more woodland and potential woodland which has naturally raised the price. The very low cost of land in the Thames Watershed is explained by the fact that it is mostly burned-over swamp land with a peat soil which is of no economic value at the present time. Actually the average price of \$5.70 per acre includes a ditch tax which exists as a lien against part of the property, so that the price of the land itself was closer to \$1.00 per acre.

On the Thames Watershed, too, most of the poorest land has now been acquired and the cost of the remainder will certainly be higher. The maximum average price has been paid by the Humber Authority. These high land values

are due to suburban development and land speculation which has influenced the value of land for a considerable distance beyond the metropolitan area. The development of a comprehensive conservation program is a long-term project and it may be fifty years before the Authority has all the land required. The present policy of acquiring and reforesting some land each year is a sound one, and where the cost of certain areas is too high the Authority can afford to wait, because in many instances the land is deteriorating in productiveness through cutting, fire, grazing and neglect and eventually the price must fall too.

3. Woodlot Improvement

(a) Grazing

"The most widespread abuse of forests is that of utilizing them as pasturage for animals. If this practice alone could be eliminated more than half the battle to save Ontario woodlots would be won. Forestry and pasturage cannot succeed on the same piece of ground, as diametrically opposite conditions are necessary for each."

"It is foolish to consider replanting millions of acres to forests unless the owners of millions of acres already under forest are convinced of the necessity and economy of caring for them in such a manner that they will be perpetuated and improved."

The preceding quotations are from the Report of the Ontario Royal Commission on Forestry, 1947, in the section dealing with forestry on private lands. They do not present new themes, for as early as 1908 the problem was formally recognised in Ontario by legislation in the Exemption of Woodland from Taxation Act. This Act, which includes a "no grazing" clause, exempts from taxation one acre in ten used for forestry purposes. It is generally admitted that the Act, in offering to the woodland owner a very slight saving in taxes, has done little for woodland conservation. Additional recognition of the problem was accorded in the same year by inauguration of the policy of establishing Provincial Forest Stations centrally in extensive areas of submarginal lands. The first such station, St. Williams, in Norfolk County, was located to function as a forest nursery to supply



Heavy grazing has destroyed all regeneration as well as the natural covering of the forest floor. If woodlot pasturing could be eliminated the most widespread abuse of farm woodlands would have been removed.

seedlings to reforest submarginal lands. Since this program began several hundred million trees have been distributed by the Government, entailing an investment of millions of dollars. Meanwhile, after 40 years of a reforestation program designed to retire submarginal lands to their most economic use, the destruction of existing woodlands on the same type of lands by domestic grazing has continued at an alarming rate.

In the Conestogo, Irvine and Whiteman Creek Watersheds the survey of all the woodland showed that 59.2 per cent of Conestogo, 77.3 per cent of the Irvine, and 45.4 per cent of Whiteman Creek Watershed was grazed. This percentage indicates that a larger percentage of the woodlands on the watersheds is grazed than on many other watersheds in Southern Ontario. This fact should be given serious consideration by the Authority when planning the Conservation program for the area. In this report some thousands of acres are recommended for reforestation, both by the Authority and by private owners. It is indeed illogical to reforest one area while the woodland on the adjacent lot is being destroyed by grazing.

There are a number of reasons for the widespread practice of allowing woodland grazing. The woodlot has always been considered a pasture field even though the value of woodland pasture is low compared to cleared land. The reason for its low carrying capacity is partly because grass grown in the shade is not nearly as high in food value as that grown in full sunlight. The following statement in respect to woodland pasture has been made by leaders in agriculture: "On the whole, the opinion of the Agronomists is that, on the average, woodland pasture will produce about one-sixth the quantity of pasturage, and the quality will be about one-half as good as that of the improved pasture". Weeds are usually prolific in wooded pastures, often smothering most of the grass.

Continued overgrazing affects natural reproduction both directly and indirectly; directly in so far as it

affects the reproduction itself and indirectly through its effect on the soil. Livestock trampling compacts the soil, breaks up the protective layer of litter, exposing the mineral soil to drying, and the cattle, by consuming the vegetation within reach, reduce the volume of litter naturally returned to the soil. It is this litter which keeps the soil open or porous and in a highly absorptive state. Thus water relations are changed, which adversely affects the rate of tree growth and may early eliminate seedlings which manage to make a start in the compacted soil.

A woodland is doomed where conditions persist which will not permit natural regeneration. After a time with no new growth to replace larger trees which die of natural causes, the canopy begins to open up, and sunlight let in further dries out the soil. Weeds and later grasses which require plenty of light gain a foothold and a sod begins to form. In general tree seeds which germinate cannot compete with an established grass cover. As these effects of grazing progress the stand becomes open or park-like and eventually all the trees disappear.

Livestock grazing affects more than the growth of trees on the owner's land. Soil erosion in the woodland increases as the absorptive capacity and mechanical protection afforded the soil by the litter is reduced. The open canopy exposes the soil to the erosive force of rain impact and a compacted soil forces overland movement of water. Livestock tend to follow trails in the woodland and these often become centres of serious erosion. Thus continued grazing increases surface run-off and soil erosion.

Soil losses and the amount of water which ran off the land were measured at the Soil Conservation Experiment Station, La Crosse, Wisconsin. The table* shows the results

* Soil Conservation Service, U.S. Department of Agriculture. Forestry Handbook (Fourth Edition). 1948. Upper Mississippi Region. Compiled and edited by S.S. Locke, Chief, Regional Forestry Division.

of six years of measurements on three separate watersheds having the same soil type.

	<u>Run-Off</u>		<u>Soil Loss</u>
	<u>Inches</u>	<u>% of Total Precipitation</u>	<u>(Lbs. per Acre)</u>
Watershed A (Grazed Woods)	2.31	1.17	2,126
Watershed B (Protected Woods)	.05	.02	19
Watershed C (Open Pasture)	.79	.40	866

- Watershed A: 2.67 acres of second-growth hardwoods.
Slope 15 - 18 per cent.
Grazed to optimum carrying capacity.
- Watershed B: 11.5 acres of second-growth hardwoods.
Slope 25 - 50 per cent.
Neither grazed nor burned.
- Watershed C: 5.85 acres cleared of second-growth timber
in 1932. Slope 25 - 35 per cent.
Grazed to optimum carrying capacity.

Basically the problem in grazing, in fact, in all woodlot forestry, is that a tree takes not one or two seasons but generally more than the lifespan of a man before it is ready for harvest. This makes the proof of woodland economics complicated and possibly beyond the understanding of many owners. It can be shown that in the long run the husbanding of the woodlot or submarginal land will return more dollars than the forage value which it may produce for livestock.

(1) The Economics of Woodland Grazing

Some examples of the economic fallacy of grazing woodlands are given.

a* The Wisconsin Agriculture Experiment Station measured the total yield per acre of dry matter from three types of pasture over a 5-year period in Richland County:

Improved pasture (grass and legume)	3,210 lbs.
Unimproved open pasture	1,453 lbs.
Woodland pasture	276 lbs.

* The Case Against Cows. Wisconsin Conservation Bulletin, December 1951.

Here the improvement of one acre of open pasture provided a gain of 1,757 pounds of feed, which is equivalent to the forage from 6.4 acres of woodland producing at the rate of 276 pounds per acre. In this case the improvement of about $6\frac{1}{2}$ acres of existing open pasture would provide all the additional roughage that could be obtained from 40 acres of woodland.

b* In Minnesota and Ohio a study of the grazing capacity of various types of pasture determined the protein and carbo-hydrate yield of the forage and the results are given in the following table. The figures are for a 6-month grazing season.

Number of Acres Required per Cow on Various Pastures

<u>Kind of Pasture</u>	<u>Acres per Cow</u>
Dense woods pasture	9 plus
Average woods pasture	4.5 to 9.0
Open woods pasture	3.0 to 4.5
Steep open pasture	2.3 to 3.6
Rolling land pasture	1.4 to 2.3
Bottom land pasture	1.1 to 1.4
Improved or legume pasture	.75 to 1.4

(Over Ontario the average allotted pasturage per animal unit for the grazing season is said to be 4 to 5 acres.)

c* The U.S. Soil Conservation Service co-operating with the Wisconsin Agriculture Experiment Station conducted studies which showed that the daily pasture cost per cow was greater in woodland pastures. Taxes and other charges against the land, fencing, costs of establishment and acres required per cow were all considered. The study showed the relative daily pasture costs per cow on different classes of pasture to be approximately as follows:

* Soil Conservation Service, U.S. Department of Agriculture, Forestry Handbook (Fourth Edition). 1948. Upper Mississippi Region. Compiled and Edited by S.S. Locke, Chief, Regional Forestry Division.

Rotation pasture	5¢
Open permanent pasture	6¢
Improved pasture	5¢
Wooded pasture	17¢

At this rate, for a 180-day grazing season, woodland pasture cost \$30.60 per cow, whereas on improved pasture the cost was \$9.00. In other words, wooded pasture cost over three times as much as improved pasture.

d* In Ohio an ungrazed woodland adjacent and similar to a grazed woodland yielded a gross income from maple syrup production of \$10.43 per acre per year greater than the grazed woods over a 5-year period (Dambach, 1944).

e A fully timbered average maple stand, 60 years old, may yield about 4,000 board feet of saw timber per acre, net scale, in the Conestogo, Irvine and Whiteman Creek areas. Such a woodlot is virtually ruined by 20 years of heavy grazing, whereas 20 years of protection and no logging may increase the net volume to approximately 8,500 board feet per acre. The gain of 4,500 board feet is equivalent to an annual increase of 225 board feet per acre. At \$28 per thousand on the stump this amounts to a mean annual gross income of \$6.30 per acre over the period of utilizing only the increase in volume.

(2) The Right of Public Concern in Woodland Grazing

Continued woodland grazing is more than the private affair of the property owner. It becomes even more than a community interest because anything which contributes to soil loss and to increased surface run-off lowers the yield capacity of the land on the one hand and on the other aids to the flood hazard. Woodland grazing lessens the volume and value of forest products which reach the market and this influences all the economy dependent upon such supplies. In these respects woodland grazing becomes a prime concern

of the Conservation Authority. It is far cheaper to maintain or restore natural existing woodlands than it is to create new forest areas artificially.

It is suggested that the policy of the Authority be education against woodland grazing by showing that it constitutes an actual loss in dollars and cents. Some of the preceding text points out that the farmer loses money by grazing his woodland and that he probably does not realize this. Of course it remains the choice of the farmer whether his plan for the farm will include a woodlot - but most farmers are open to sound suggestions on how to make a better living at farming. It should be recognized that the woodland is a forestry problem on the farm and that close liaison between woodland and agricultural specialists is required.

Thus it is necessary to show the farmer that the annual contribution of managed woodland to his economy can be significant and can far outweigh annual woodland forage value. At the same time it should be shown that it costs more per cow to carry stock on poor pasture than on good pasture and that the best way to obtain forage equivalent to that lost in fencing woodlands is to improve existing open pasture.

The Authority will find very little local or regional data on woodlands to prove their arguments on economic return, and the Authority should recommend that the appropriate authorities extend their studies in this field. However, the Authority may expect invaluable assistance to be willingly given in this field by local wood-using industries. Some of these have been located in the area for decades and are dependent on continued supply from local woodlands.

(b) Fencing Woodlots from Cattle

If shade is required for stock, it may be desirable to leave a portion of the woodlot in the pasture when fencing the woodlot. Another solution is to establish small groves of fast-growing hardwoods which can be temporarily fenced

until the trees are sufficiently tall that browsing will not damage crown growth.

Where springs that supply water for the stock are situated in the woodlot access may be made to a trough near the spring and the area should be fenced to prevent trampling.

The number of cattle permitted to graze and the size of the woodlot have a direct relationship to the damage which is done. A large woodlot, of course, is not as seriously damaged by a few head of cattle as a small one. However, in most cases where grazing is permitted over a number of seasons the damage is serious.

Livestock admitted to woodland browse on the leaves and shoots of small trees and ride them down, and by cuffing the surface roots of larger trees injure them and permit entry of fungous diseases.

Field observations indicate that cattle have preference habits in grazing woodlands. Unfortunately this preference is for the more economically desirable species such as maple, basswood, elm and beech, whereas undesirable species such as hornbeam, blue beech, dogwood and hawthorn are grazed only when cattle are seriously underfed. Coniferous species are rarely browsed. This combination of factors, under continued grazing, changes not only the quantity but the quality of the reproduction and so the succeeding stand. The poorer hardwood species, and conifers where these occur, are favoured. The invasion of pastures by cedar and hawthorn is an illustration of this grazing preference.

It has been suggested from different quarters that the fencing of woodlands is expensive and that part of such expense should be borne by the Authority. Such a program is under way in Halton County and may appeal to the other counties in the watershed as well as the Grand Authority. However, it may be strongly argued that this is in effect subsidizing the production of livestock since it is the livestock which create the need for fences.

(c) Scrubland

The total area of scrubland on the Conestogo, Irvine and Whiteman Watersheds is 5,626 acres of which 1,567 acres are dry scrub and 4,059 are wet scrub. In other words one acre in 62 is scrubland and absolutely non-productive. This is in one of the most highly productive agricultural areas of Southern Ontario.

Scrubland has been placed in two categories: dry-sited scrub, which includes such species as hawthorn, apple and sumach, and wet-sited scrub - willow, dogwood and alder. Dry-sited scrubland is usually land which has been overgrazed and neglected for many years. The soil may be unsuited to agriculture because of poor quality, excessive steepness or inaccessibility. On the other hand, it may be fairly good farmland which the owner has not been able or willing to maintain in good pasture, so that shrubs which are unpalatable to cattle have taken over the area.

Wet-sited scrubland is land with imperfect drainage, often bordering swamps. The bush has been cleared from it but the subsequent pasture has been so poor that shrubs such as willow and dogwood, which require a damp site, have invaded the area.

Frequently scrub areas of these two types are suitable only for trees. They should be reforested and the acquisition of some of them by the Authority has been recommended. The wet-site areas present a problem in planting, and research should be undertaken to determine the best method of handling them. There appears to be a natural succession from neglected pasture land through willow scrub, trembling aspen, white elm and black ash to the climax types of silver maple - white elm or black ash - white elm - red maple, and every effort should be made to determine the best method of speeding up this succession.

In addition to the larger areas there are innumerable smaller areas, often in long strips along the

Where wet site forest has been slashed off, or where wet pasture is neglected, useless shrubs such as willow and dogwood may occupy the land. There are 4,059 acres of scrubland in the Whiteman - Conestogo - Irvine area which should be placed under management to encourage the growth of more valuable species.



The irregular tracts of rolling land which have a low land use capability due to excessive slope and erosion should be reforested either by the Authority or through a program to encourage reforestation by private owners.

In a very few years these scrublands become "jungles" where trees cannot secure a foothold. The owner must decide whether he is prepared to clear the area or kill the scrub and plant trees.



borders of stream valleys, which will always be in private hands. The aggregate effect of this on stream flow is very considerable. These should be planted with trees to form part of the farm woodlots where they occur. Many of them should be placed under a reforestation and controlled woodlot scheme by agreement with the Authority, especially where they cover the sources of streams or steep slopes where erosion is or may become a problem. Under this scheme the owner would get considerable help from the Authority in the establishment and maintenance of the woods, but would not be permitted to cut them indiscriminately.

Woodlot Management Program

A program of woodlot management should be one of the main forest conservation measures undertaken in the Onestogo-Irvine-Whiteman Watersheds. The woodlot inventory indicates 26,834 acres of woodland on the watersheds, the vast majority of which is in need of some form of woodlot improvement. One of the most difficult problems confronting the private owner in the management of his woodland is the utilization of the small woodland products which can be readily made and handled by the owner. Some of these products such as fuelwood, pulpwood, bolts, posts and poles, if properly harvested, increase the productivity of the woodlot and the gross returns per acre. Very often it is the difficulty of marketing low-grade material which makes it almost impossible to carry out the necessary improvement work, and any means which can be discovered of utilizing small and poor-grade wood should be developed to the fullest extent. At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of a portable chipper. Such chips can be used for the manufacture of pulp for paper, and as bedding for cattle and litter for chickens which can subsequently be spread in fields to increase the humus content of the soil. They can be made from any species of wood, and tops and branches can be utilized. The number of pulp companies which can use hardwoods

is limited at the present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers are being developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips.

5. Diameter Limits

The basic method of control usually advocated is cutting to a diameter limit; that is, that all trees below a certain diameter - for example, fourteen inches - should not be cut. Such a regulation may or may not be good forestry. In most cases it would not be, because there would be much worthless material below this diameter limit, such as poplar, thorn, willow and other species, which should be taken out. At the same time there would be certain large trees above the diameter limit which should be left for the benefit of the forest as well as trees suitable for reseeding the area. The diameter limit should not be a fixed rule but simply a guiding principle, a sort of yardstick on which the landowner can base his calculations. In an area the size of the Conestogo, Irvine and Whiteman Creek Watersheds a program of individual woodlot examination should not be too heavy a burden on the Conservation Authority.

Twenty counties, including Wellington, Waterloo, Dufferin, Brant, Oxford and Perth, have passed by-laws under The Trees Act (R.S.O. 1950, c.399) which empowers a county council to pass by-laws restricting and regulating the cutting of trees. In each case the by-law has fixed minimum diameter limits below which trees may not be cut except in special circumstances. The object of this is to prevent the cutting of trees at the time when they are putting on their greatest diameter growth. These limits are usually 5 or 6 inches for white cedar, red cedar and black locust and range from 10 inches to 16 inches in the various counties for all other species. The limits which have been set are actually far too low for the

COUNTY BY-LAWS RESTRICTING THE CUTTING OF TREES
UNDER THE TREES ACT

City	By-Law No. & Date	DBH or 18" st.	Diameter Limits in Inches							
			5	6	7	8	10	12	14	16
at	849 2.11.48	18"	CE	-	-	-	-	-	Rem.	-
ce	1452 13.6.53	18"	-	-	-	BIw.PO CEw	-	Rem.	ASw.BA OA.ELr MAb.MAh PIw.PIr	-
erin	1011 & 1020 28.11.47 amended 23.1.48	18"	CEw.CEr	-	-	-	BA	Rem.	-	-
ham	1695 8.4.53	DBH	BI.ASb LOb.CE MA(soft) LAt.WI	-	-	-	Rem.	-	-	-
chum- land	1653									
in	1499 24.1.47	DBH	CE.LOb	-	-	-	-	Rem.	-	-
er	1555 27.6.47	18"	-	CEw	-	PO.BIw	-	Rem.	-	-
li- nd	1331 13.5.49	18"	-	CEw.CEr	-	CHb.CHp POc.POl POb	BI	BA.CT CO.CU GU.HC SY.TU HE	Rem.	-
on	819 15.4.47	18"	-	-	CE	-	-	-	Rem.	-
on	44 21.11.46	DBH	CE	-	-	-	-	Rem.	-	-
pton	921 12.6.48	18"	-	-	CE	-	-	Rem.	-	-
ds/ en- ile	1727 13.6.53	18"	-	-	-	-	BIw FI	-	BEa.ELw MAS PIs.PIj	- Rem.
coln	1534 18.11.52	18"	-	CEw.CEr POt.POl POc	-	-	-	-	-	Rem.
lle- k	2226 12.3.47	18"	-	CEw.CEr	-	-	-	-	Rem.	-
olk	856 23.1.47	18"	-	CEw.CEr	-	-	-	-	Rem.	-
ord	1412 27.1.48	DBH	CE	-	-	-	-	Rem.	-	-
th	854 25.1.47	DBH	CE	-	-	-	-	-	-	Rem.
er- p	1170 23.10.46	DBH	CE	-	-	-	-	-	Rem.	-
ling- n	1733 15.6.46	DBH	CE	-	-	-	-	Rem.	-	-
o- th	1468 12.5.49	18"	-	CE	-	-	-	-	Rem.	-
k	2406 18.11.49	18"	See special note †				-	-	All species	-

Exempt from By-Law - Hawthorn, Choke Cherry, Red or Pin Cherry, Poplar, Ironwood, Manitoba Maple.

Exempt from By-Law - Hawthorn, Choke Cherry, Red or Pin Cherry, Poplar, Ironwood, Manitoba Maple, Wild Apple, Black Locust, Cedar, Tamarack, White Birch, Willow.

For abbreviations see next page.

final crop trees as most trees are making their maximum diameter growth after they reach 18 inches in diameter, but it is an elementary step in the right direction.

6. Private Reforestation Program

The Conestogo-Irvine-Whiteman Watersheds contain a fairly large area of small tracts of land which are suitable for reforestation. As these tracts are too small and irregular to absorb into an Authority forest, they are more suitable for private planting. Reforestation, combined with the protection of natural woodlots, is essential if farmers are to have sufficient woodland to supply the local community with fuelwood, fence posts and poles, and to have a few sawlogs for sale which will provide a cash crop at times when the prices of other farm products are depressed. Reforestation of certain areas will not only mean that the land will be producing a crop where little or nothing of value is growing now, but it will also assist in providing adequate protection for the soil and will retard run-off of water from melting snow and rain, thus making for a more even stream flow throughout the year.

If the Authority is able to stimulate interest in private reforestation the resulting plantations will do much to assist the general woodland conservation program. The value of creating interest among the farmers on the watershed cannot be over-stressed. The Authority and municipal bodies can do a great deal towards establishing and managing the larger areas within the watershed; however, without the co-operative attitude of the private landowners in the watershed, the complete program of woodlot management and reforestation of the less productive lands cannot be accomplished.

The interest of private owners in reforestation may be fostered in many ways; the value of public education is of primary importance and is looked after by the Zone Forester in the district. The Authority could aid private reforestation programs by assisting the owners in the establishment of the private plantations.

To encourage private reforestation, other Authorities have purchased tree-planters to assist in the planting programs on the Authority Forests and for use in custom planting in privately owned plantations. The Saugeen Authority supplies a tree-planter, tractor and an experienced planting crew for the nominal sum of \$2.50 per hour. Where the land is too rough or stony to utilize a tree-planter, the Authority will refund \$10 per acre for each acre of land which has been hand-planted, one year after planting.

7. Forest Insects and Diseases

(a) Forest Insects

In any project, such as that proposed for the Conestogo-Irvine-Whiteman Creek Watersheds, careful consideration should be given to the prevention of insect outbreaks and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

It is important to avoid the planting of large areas of one kind of tree, otherwise conditions will be ideal for an outbreak of abnormal numbers of some insects which prefer the food afforded by that particular host. It is preferable to plant in blocks, the blocks distributed so that trees of one species are separated by blocks of different tree species. This tends to keep outbreaks localized until natural agencies bring them under control and facilitates direct control measures if such become necessary.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to insect attack than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and

wood-boring insects which may become excessively abundant and attack healthy adjacent trees.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects.

Woodcutting operations, sawmill sites and wood storage yards should be carefully supervised or they may become reservoirs of infestation.

It is essential that surveys for insect conditions be made each year so that any abnormal increase in insect populations may be noted and control operations initiated before they develop to outbreak proportions. Serious and widespread outbreaks are frequently prevented by prompt and well-timed spraying operations over a comparatively small area. It is therefore necessary that spraying equipment be available and that laneways be maintained within the plantations for spraying purposes. Outbreaks of an extensive nature can generally be brought under effective control by strip spraying. In this method, alternate strips of trees in large plantations are sprayed, thus reducing the initial infestation and at the same time causing the native parasites to concentrate and build up in the unsprayed portions. This reduces spraying operations and the number of lanes required for the passage of spraying equipment.

Owing to the danger of injury by the white pine weevil, white pine should not be planted in pure stands unless the stands are very densely stocked in a good site. It is better to grow white pine in mixture with some immune species such as the better hardwoods. The protecting species should be taller than the white pine, at least in the early years.

In conclusion, it should be recognised that protection against leaf-feeding insects is very desirable since defoliation of a tree weakens it and thus makes it more susceptible to attack by bark-beetles and wood-boring insects as well as by organisms which do not usually attack healthy

trees but which will hasten the death of weakened trees. Leaf-feeding insects alone may kill a thrifty, broad-leaved deciduous tree by completely defoliating it for three years in succession. Conifers, however, are usually killed as a result of one complete defoliation.

(b) Tree Diseases

Productive woodlands require protection against fire trespass, grazing animals and rodents, insects and disease. Protection is a part of forest management, and under a policy of sustained yield will be maintained in continuity. Good forest management is reflected in the health of woods and, conversely, damage on account of disease is often a sign of mismanagement or neglect. In general, an objective of maximum yield, with attendant intensive silviculture, is compatible with, and often facilitates, protection and disease control.

For the purpose of discussing their pathology and protection, the hardwoods may be considered separately from pine in natural stands or plantations. The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots on the Conestogo-Irvine-Whiteman Creek Watersheds present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings, designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees

infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other wood operations.

Hardwoods are commonly cut selectively and not infrequently in clear fellings. Few foresters will approve the latter system, which is in fact often intended as a liquidation of the property. A system based on yearly selection, or frequent periodic return to conveniently planned subdivisions, has obvious advantages for small woods, and is well adapted to the control of decay.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. While favouring the valuable species, those sprouts which, on account of decay hazard, are of undesirable origin should be eliminated. Such will comprise sprouts from the larger stumps and those from above-ground position.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

White pine is found in young plantations and in natural stands, almost pure or mixed with hardwoods. From the latter stands it tends to disappear on account of hardwood competition, except on sites which are particularly favourable for its reproduction. The white pine blister rust, which with the well known shoot weevil is a principal enemy of the species, is a factor contributing towards the elimination of seedlings and young trees.

White pine should be encouraged on those sites which are naturally suited to its reproduction so that fairly compact growth may be secured, thereby facilitating the protection problem. It is an important and valuable species in Southern Ontario, and its cultivation should be promoted by

the institution of effective blister rust control facilities.

White pine has become increasingly more important since European Pine Shoot Moth populations have increased to epidemic proportions. At the present time white pine appears to be the one species of pine, common to Southern Ontario, which is not seriously affected by this pest. Consequently it may be advisable, where site is not a controlling factor, to select white pine stock in preference to other pine species.

3. Snow Fences and Windbreaks

(a) Snow Fences

In the climate of Southern Ontario snow drifting may cause much inconvenience and sometimes hardship, and this is particularly true on the Conestogo and Irvine Watersheds. Control can be readily effected by means of windbreaks and is dependent on proper placing with reference to lanes of travel and topographic features.

Where space is limited or land valuable, lath or board fences are frequently used, but the cost of erection, removal or maintenance of these can be materially reduced by using trees as permanent windbreaks or shelterbelts. One or two rows of trees are usually referred to as a windbreak and more than two rows as a shelterbelt. The latter is preferable if space permits as it gives better and more permanent protection.

The prevailing winds in Southern Ontario are generally from the west so protection is usually required on the west side of north-south roads, on the north-west side of northeast-southwest roads, on the south-west side of north-west-southeast roads and on the north side of east-west roads.

The object of a snow fence is to mechanically reduce wind velocity near the ground in such a manner as to cause a drift to form where it will be least harmful. The reduction in velocity creates two pools of relatively calm air, a small one on the windward side and a much larger one on the leeward side, and it is here that drifts form, leaving the area further to the leeward free of drifts and comparatively



This stream has been trampled by cattle. The small portion of pasture should be fenced and reforested as a stream improvement project.



Most well-planned farms will include windbreaks and shelterbelts to control wind erosion, snow drifting and moisture loss.

free of snow. The deepest part of the calm pool is close to the windbreak; if the windbreak is open at the bottom - that is, composed of trees with few or no branches near the ground - the deepest part will move further to leeward. As winds become stronger both the depth expressed in terms of velocity reduction and the width of the pool on the leeward side will increase and the centre will tend to move further away from the windbreak.

A single row of trees, unless it is a dense coniferous type, is seldom dense enough to completely stop winter wind and may create drifts, just as poor placement of windbreaks may accentuate drifting conditions.

A wide belt of trees which will accumulate a large drift of snow on its windward side may be planted right to the edge of the road, the windward edge extending back a distance equal to three or four times the height of the trees and generally at least 100 feet.

In some places the snow trap type of windbreak is effectively used. It is composed of one or more rows of trees close to the road with a wide opening to windward and then a single row of trees. The single row arrests the first force of the wind and the snow is deposited in the opening. This has the advantage of requiring fewer trees than the shelterbelt and leaving the ground between open for cultivation in summer.

Any prejudice which may exist against windbreaks for protection against drifting snow on roads arises from poor or poorly placed windbreaks. If a windbreak has openings in it or if it ends abruptly streamer drifts will form. Windbreaks should be kept dense and tapered down at the ends by using progressively smaller species of trees and shrubs to prevent the formation of streamer drifts.

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties.

The practice of the Department is to acquire the land by purchase to a width of 100 feet from the centre line of the pavement and plant a three-row windbreak 80 feet from the centre line. The land is ploughed and cultivated and bushy stock about 2 feet high is used. Weeds are kept mowed between the rows and on the open strip between the windbreak and the pavement, which entails a lot of work on the part of the maintenance crews in summer. The windbreaks are kept down to a height of 7 feet, partly because many farmers object to their view of the highway being obstructed and also because they are proud of their herds and fields which they want to be visible to passers-by. Also cutting the tops off the trees reduces the temptation, which some persons find irresistible, to cut them for Christmas trees.

County practice varies; sometimes the land is purchased, sometimes it is leased and sometimes it is planted by agreement. In all cases the County erects a fence behind the trees. In return for the use of the land one county plants a three-row windbreak around the farm buildings. Waterloo County has planted an excellent shelterbelt over four miles long on the west side of the county road running north through Linwood. Here the County has acquired a twelve-rod strip (198 feet) and planted the six-rod strip farther from the road, leaving the six-rod strip next to the road to catch the drift while the trees are small. When the trees get bigger it is planned to complete the shelterbelt by planting the six-rod strip next to the road. The trees used are transplant stock about one foot high obtained from the Department of Lands and Forests and planted in furrows. Weeds are kept mowed until the trees are large enough to shade them out.

The species of trees used are Scotch, jack, red and white pine, white and Norway spruce and white and red cedar. The Department of Highways uses both white and red cedar, which it obtains from areas where they are growing naturally, as well as some species usually considered as ornamental stock which it

grows in its nurseries. These include mugho pine, barberry and Chinese elm. This last is the only hardwood tree used in windbreaks. It grows rapidly and its fine branching system makes it nearly as effective as an evergreen tree. The other common hardwoods such as Carolina poplar, white elm, silver maple and white ash are used fairly extensively in shelterbelts.

Snow fences are usually beneficial to crops in that they hold moisture in the fields in the form of snow in winter and reduce wind velocities and moisture loss by evaporation in summer. Occasionally they do cause ice to form over crops such as fall wheat and may be harmful in this way. The beneficial effects, however, outweigh the harmful ones so considerably that every encouragement should be given to their establishment in place of the removable type of slash fence currently in use.

(b) Windbreaks

In the process of clearing land for agriculture, woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario, and especially in the tobacco areas of the Whiteman Creek watershed.

When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows:

(1) Direct Effects

- a Wind damage and lodging in small grains and corn is reduced or eliminated.
- b Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.
- c Wind erosion of the soil is minimized.

(2) Indirect Effects

- a Moisture loss by evaporation is reduced.
- b Temperatures in the fields are raised, which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.
- c Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house, per day or per hour, with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective background for the house and a protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and small animals.

Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet

high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the windbreak and tapers out to zero further away. With higher wind velocities and/or higher trees the proportionate reduction and the effective range will be greater.

European alder is gaining great popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species. In fact, tobacco is frequently planted close to it with little loss in size or vigour of the plants. As the robbing of the soil is one of the severest criticisms levelled against windbreaks, consideration should also be given to the planting of such leguminous trees as honey locust and caragana on certain sites.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage the establishment of windbreaks by private owners in every way.

It is recommended that the Authority institute a windbreak-planting program, especially in the areas which have been more recently cleared for tobacco where tracts of 10 or 30 acres and more have been stripped of all cover.

This program could include the furnishing of a tree-planting machine at a nominal rental to owners for the purpose of establishing windbreaks which would break up tobacco farms into 10-acre fields.

9. Forest Fire Protection in Southern Ontario

The task of protecting woodlands from fire in Southern Ontario presents a very different problem, or rather series of problems, from those of Northern Ontario, and consequently must be handled in a somewhat different manner. Fire is a more serious question on the Whiteman Creek Watershed than the Conestogo-Irvine, and it is a question to which attention should be given.

Northern Ontario is predominantly forest land, the population is sparse, parties travelling through the forested areas are fairly readily accounted for by means of a permit system during the fire season, and watch is maintained for fire by means of look-out towers and air patrol.

In Southern Ontario, south of the Canadian Shield the land is normally potential agricultural land with the woodland surviving in isolated patches as farm woodlots or in larger more or less continuous blocks of swamp or sand up to ten thousand acres in extent. The population is, relatively speaking, fairly dense, no part of any woodland is more than two miles from the nearest human habitation and most roads are travelled by a comparatively large number of people.

In spite of the publicity given to the damage caused by fire the average person does not realize how serious this is. Though he may know that young growth and small trees are burned by surface fires he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also

injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

Many landowners in Southern Ontario are so completely unaware of, or indifferent to, the damaging effects of fire that they deliberately set fire in peat land to burn off the peat, starting fires which it is next to impossible to extinguish. Such fires burn for months, even under the snow, destroying many acres of woodland every year, not only on the land of the person setting the fire but frequently spreading over land adjacent to it.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings.

Experience in the United States has shown that the most effective fire protective systems in rural districts are those set up under a state organization with local wardens appointed by the state forester on the recommendation of the local town* councils. In the rural parts of the state of Maine each town appoints its own fire wardens who handle fire protection in the town quite independently of other towns. This means there is a lack of co-operation between towns, wardens receive little practical training, organization is loose, and as wardens hold office at the pleasure of the town council there is a serious lack of continuity in administration.

*The "town" in the Eastern United States corresponds closely to the township in Canada.

In New Hampshire and Vermont wardens are appointed by the state forester on the recommendation of the council and in Vermont they serve until they resign or are removed for cause by the state forester.

Mr. H. H. Chapman, writing in the Journal of Forestry, states*: "It is not unreasonable to conclude that the ratio of 34 to 1 in damage per acre of woodland between these two states (Maine and New Hampshire) is the direct consequence of Maine's failure to depart from the 'fire bucket' principle of town organization."

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

- (a) Where the system is organized under the direction and control of the state forester and the wardens in each town are appointed by him on the recommendation of the local council.
- (b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting fire. They have the power to call out other local residents to help in fire-fighting and maintain a store of fire-fighting tools on their premises.
- (c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.
- (d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed

- (e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.
- (f) Where fires for burning brush and rubbish may be set only after a permit has been obtained from the local firewarden.

It is therefore recommended that the Authority set up a committee to determine the best method of providing fire protection for public and private lands, through the co-operation of the Department of Lands and Forests, for the protection of plantations and woodlands.

CHAPTER 5

FOREST HARVEST

The forests of the Conestogo-Irvine and Whiteman Watersheds varied in their influence on the economic development of the region. Throughout most of the Conestogo, Irvine, Nith and the northern portion of Whiteman Creek Watersheds, the original forests were virtually pure hardwoods. These forests had a limited value, as the pioneer markets required softwoods for local use and for the European export market. It was only in the southern portion of the Whiteman Creek Watershed, which contained a higher percentage of softwoods, that lumbering played an important part in the settlement of the region. While the supply of pine and oak sawlogs was plentiful, a large number of mills flourished. The industry, however, waned as the virgin forest was depleted, until present milling has been reduced to a few small mills which operate almost exclusively on custom sawing for local farm woodlot owners.

1. Conestogo-Irvine

Forestry has never been a major factor in the economic development of the area, although over one million and a half board feet are processed annually within the watershed. The sawlogs, however, are mostly imported from areas outside the watershed. One large mill in the southern portion of the watershed produces most of the lumber which is milled in the valley and this mill derives most of its log supply from woodlands as far as sixty miles outside the watershed. The only locally produced lumber from woodlots on the watershed consists of 175,000 feet board measure which is milled on a custom basis for local woodlot owners.

There are eight establishments which are classed as wood-using industries. These are generally divided into two groups: the wholesale-retail builders, supplies and wood products manufacturers. There are three lumber dealers

in the area; two of these mills produce dressed lumber, doors, sash and builders' supplies while the third is a wholesale-retail dealer.

The five wood products manufactures produce a variety of commodities including chairs, threshers, potato pickers, factory trucks, ladders, wagons, wheelbarrows, plastic-coated seats and towel rails. The manufacturers utilize hardwoods almost exclusively. This is obtained both locally and regionally. The chief hardwoods used are hard maple, yellow birch, basswood, oak, white birch, white elm, and white ash.

The lumber yards market chiefly to the construction field, thus their turnover is mainly softwoods (90 per cent). The softwoods include eastern white spruce, western red cedar, Douglas fir, white, red, sugar and jack pine, and hemlock. The millwork utilizes mostly imported softwoods for manufacturing sash, door and interior trim.

2. Whiteman Creek

As Whiteman Creek Watershed is a relatively small area, it contains only four small sawmills. These are portable-type mills which operate only as a part-time spring operation which relies exclusively on custom milling. The custom rates vary from \$12 per thousand board feet to a maximum of \$17 per thousand. These mills saw various species, the chief of which are white elm and white pine. Varying amounts of maple, poplar, basswood, beech and cedar are also milled.

The woodlot inventory established that the supply of sawlogs is limited in the watershed. This reduction is the main reason for the seasonal or part-time type of operations which exist and it is also the chief reason for the closing of two mills recently.

Mill No.	Mill Type	Mill Cut		Total Daily Output	Annual Output
		Hardwood %	Softwood %		
1	Portable	90	10	5,000	90,000
2	Permanent	60	40	3,000	50,000
3	Portable	50	50	2,000	35,000
4	Permanent	50	50	2,000	40,000
		63%	37%	12,000	215,000

The wood-using industries which are situated within the watershed are limited to three lumber dealers and a Christmas tree dealer. These lumber dealers import all their lumber from outside the watershed, consequently the present local produce from woodlands within the watershed is totally inadequate to supply even local demands.

The Christmas tree dealer operates a limited production from his own four-acre plantation. The operation is based on a sustained yield operation of 200 trees per year. After the crop is removed each year, a further planting is made to maintain a continued supply.

WILDLIFE

CHAPTER 1

IMPROVING THE LAND FOR WILDLIFE

There are many varied types of land in the Whiteman Creek Watershed. The requirements of food and cover vary greatly for different species of wildlife. The recommendations here listed are therefore those which can be most generally applied by the landowner.

1. Woodlands

The elimination of grazing of woodlots would be the most useful single measure in improving the wildlife environment. Reforestation plans are included in the Forestry report. In plantations, up to about the tenth year from planting, the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after the twelfth year from planting, have little or no undergrowth and will, apart from their edges, be comparatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will therefore come from good management of the farm woodlot. Selective cutting is both sound forestry practice and good planning for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas, and who wish to produce a proper environment for wildlife, will find that release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale will improve rather than retard the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where rabbits are desired, two or three such brush piles per acre being the normal spacing.

2. Cultivation Practices

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. A few special practices will give more specific benefits. Strip-cropping, described elsewhere in this report, is of particular value since by this means no extensive area

is denuded of cover at one time by harvesting. In the less flat parts of the watershed, filter strips, either above water-diversion terraces or used as emergency waterways, provide travel lanes and nesting cover for wildlife. Cover crops such as the clovers provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months.

The elimination of brushy fencerows is now becoming more common on the Whiteman Creek Watershed. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife, and harbour large numbers of songbirds which help to control insect pests. Inevitably the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions. Rosa multiflora is an excellent hedge-forming shrub. It has a tendency in Southern Ontario to die back in winter, but rapidly forms a dense hedge, which is reported to be proof against cattle and hogs. It provides both cover and food and does not exhaust the nearby cultivated ground. However, in view of its questionable hardiness, it should not be planted on the Whiteman Creek Watershed without consultation with the nearest biologist or forester of the Department of Lands and Forests.

3. Cover Patches

Field corners are frequently barren of crops. Therefore a fence crossing which embraces the corners of four fields may be made into a haven for ground-nesting species by planting a few trees and shrubs and protecting them. It is important to rid such areas of useless weeds by crowding them out with useful species such as white sweet clover or the normal climax type of open vegetation, which is bluegrass.

4. Ponds and Streams

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a

small amount of work with a scoop will provide a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. Willow cuttings pushed in the ground around such a hollow will rapidly provide wildlife cover. New water areas are usually very rapidly invaded by aquatic plants, but additional species may have to be introduced. No extensive duck food studies have been made in Southern Ontario. Wild rice may be introduced, but since it is not well adapted to wide variations in water levels, being often sterile in fluctuating waters, it cannot be considered as certain to succeed. The idea has long been current, and fostered by many sportsmen's organizations, that the planting of wild rice is the answer to the problem of how to attract ducks to any area. The fact is that wild rice is of little significance to ducks in Canada except in the fall, and does not provide good cover or nesting sites. The following species which may be easily obtained are recommended as certain to be valuable duck foods. If none of them occur in ponds or shallows with good cover for ducks they can be introduced.

Sage Pondweed	<u>Potamogeton pectinatus L.</u>
Red-Head Pondweed	<u>Potamogeton Richardsonii</u> (Ar. Benn.) Rydb.
Wild Millet	<u>Echinochloa crusgalli (L) Beauv.</u>
Japanese Millet	<u>Echinochloa frumentacea (Roxb) Link</u>
Wild Celery	<u>Vallisneria americana Michx.</u>
Knotweed	<u>Polygonum pennsylvanicum L.</u>
Water-Smartweed	<u>Polygonum coccineum Muhl.</u>
Three-square	<u>Scirpus americanus Pers.</u>
Great Bulrush	<u>Scirpus validus Vahl., var.</u> <u>creber Fern.</u>

Those who are interested in farm ponds for wildlife will find very useful details of the various types of pond and methods for constructing each type in a booklet "Farm Ponds" which is available from the Conservation Authority. Farm ponds differ from those intended for wildlife in that care is usually taken to prevent the growth of aquatic vegetation in a farm pond intended only for watering stock or fire protection purposes. Otherwise the construction and details of ponds for wildlife should follow one of the types there described.

CHAPTER 2

FISH

1. Introduction

The purpose of this survey was to make a preliminary examination of the waters of the drainage basin and to classify them as to their present suitability for fish; and secondly, to make recommendations for possible improvements.

2. Stream Studies

Stream studies are in a different category from other aspects of wildlife conservation, for two reasons:

(a) because a major part of conservation work consists of the proper control and use of water;

(b) because no reconnaissance surveys are available concerning stream conditions on Whiteman's Creek and its tributaries, Horner's Creek and Kenny Creek.

For these reasons a reconnaissance survey was carried out of the condition of these waters.

Methods

The procedure here adopted followed closely that used in previous surveys of the Nith and Speed River systems. Whiteman's Creek and its tributaries were visited at 65 "stations". The stations were from half a mile to three miles apart on each stream course. The topographic features of the valley and the erosion, vegetation, volume of flow, turbidity, temperature and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made. At most of the stations collections of fish were also made. The collections were later examined and classified, and were used in zoning the various sections of the river, as shown on the accompanying map.

The aquatic insects such as mayflies, stoneflies and caddisflies were most useful for this purpose, since many of them are reliable indicators of the stream conditions at

the critical time of year. Some species are confined to waters which remain cold and clear in summer, such as trout waters. Others are indicators of permanent flow or of polluted water or of the maximum summer temperature of the water. Thus the potentialities of a stream for particular species of fish are indicated. The fish collections substantiated these findings at their particular stations.

Since the procedure here used follows that of all previous river surveys by the Department of Planning and Development, it allows close comparisons of the characteristics of many rivers. The present criteria and methods were developed from more intensive year-round research carried out on parts of the Nottawasaga River and Algonquin Park streams, already reported on * and from other unpublished research data made available for this work.

The streams were examined between May 20 and June 25, 1953, and many of them were examined only once. It was therefore necessary to rely on deductions made from the presence or absence of species which many previous tests had shown to be reliable indicators. Maximum and minimum thermometers were installed in the water at six stations during June. At the time they were removed the maximum summer water temperatures had probably not yet been reached, but the records substantiated the findings already based on indicator species of the fauna.

* Ide, F.P. The Effect of Temperature on the Distribution of the Mayfly Fauna of the Stream. University of Toronto Studies, Biology 39, Publication Ontario Fish Research Laboratory 50, 1935.

Ide, F.P. Quantitative Determination of the Insect Fauna of Rapid Water. University of Toronto Studies, Biology 47, Publication Ontario Fish Research Laboratory 59, 1940.

Sprules, W.M. An Ecological Investigation of Stream Insects in Algonquin Park, Ontario. University of Toronto Studies, Biology 56, Publication Ontario Fish Research Laboratory 69, 1947.

The River Valley

The conditions which determine the kinds and numbers of fish inhabiting a river system are in part a product of the physiographic conditions of the watershed. The major features determining the river's course and condition are therefore mentioned here.

Horner's Creek, the most important tributary, rises near No. 7 Highway in Perth County. Its two major watercourses run southwards parallel, joining together near the mouth. Both of these watercourses run in relatively flat land having chiefly clay soil. The watercourses are much ditched and tend to be blocked. The upper mile of the western source, however, comes from several good spring sources near the headwaters of the Avon River near Shakespeare. The eastern branch is not important for fish, its water being almost entirely run-off.

Below the junction the stream flows in a poorly drained valley with many wooded swamps. Here the stream has several short but permanent tributaries coming from the intersection of sandy soil over impervious layers. This condition persists into Burford Township where the stream joins Kenny Creek. The two creeks join to form Whiteman's Creek, which then flows east to join the Grand River. Near Burford the west tributary on the watershed flows in from the north, with excellent spring sources.

Kenny Creek rises in the fertile, heavily cultivated, rolling land at the eastern side of Oxford East Township, and flows east through a sand plain to join Whiteman's Creek, which continues through the sand plain and later runs in a deep and wide valley to join the Grand River. There is no outcropping of bedrock in any of these creeks. The net result of the running of the upper course of both Horner's Creek and Kenny Creek through clay soils is found in the silted condition of the bottom of these and Whiteman's Creek. Only in a very

WHITEMAN CREEK WATERSHED

DEPARTMENT OF PLANNING & DEVELOPMENT SURVEY 1953

SHOWING

BIOLOGICAL CONDITIONS OF STREAMS

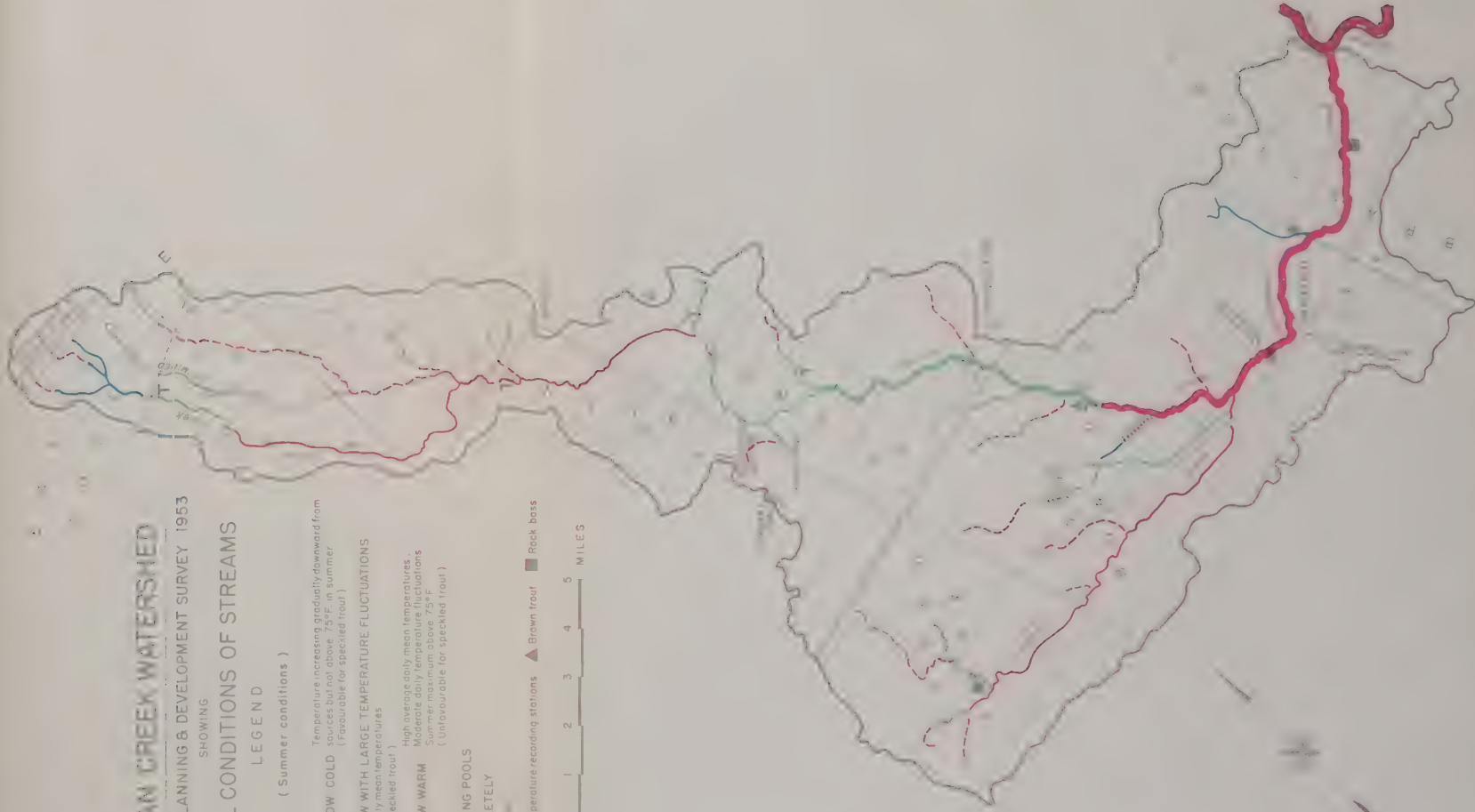
LEGEND

(Summer conditions)

- PERMANENT FLOW COLD
Temperature increasing gradually downward from sources but remaining above 50° F. in summer
(Favourable for speckled trout)
- PERMANENT FLOW WITH LARGE TEMPERATURE FLUCTUATIONS
Moderate average daily mean temperatures
(Unfavourable for speckled trout)
- PERMANENT FLOW WARM
High average daily mean temperatures
Moderate daily temperature fluctuations
(Unfavourable for speckled trout)
- - - DRIES TO STANDING POOLS
- - - DRIES UP COMPLETELY

T Maximum - minimum temperature recording stations ▲ Brown trout ■ Rock bass

SCALE 1 0 1 2 3 4 5 MILES



few locations are there good gravel bottoms. These lie chiefly in the mid-section of Horner's Creek, where it flows through the glacial spillway.

4. Gradients

The gradients of the various branches are as follows:

<u>Creek</u>	<u>Length</u>	<u>Gradient</u>
Kenny Creek	8 miles	15 feet per mile
Horner's Creek including Whiteman's Creek	38 miles	13 feet per mile

However, the upper west branch of Horner's Creek drops some 15 feet in its first mile, so that the average of the remainder of the river is much less than 13 feet per mile. It flows in fact for some distance in a flat plain and later, south of Wright, has many rapids.

5. Permanence of Flow

The permanence of flow of the various branches of the creeks is shown on the accompanying map "Biological Conditions of Streams". A few comments may be added to the information on the map. The sources of Kenny Creek may be expected to dry up completely in a very dry summer. The seepage into Horner's Creek from the central "spillway" section and from one tributary draining a swamp north-east of Drumbo, can be expected to maintain flow in the river even in very dry summers. The normal summer flows could not be estimated in the usual manner during the survey, as the whole watershed and ground water level were obviously affected by several heavy rains in June, one of which raised the creeks and adjoining rivers such as the Nith to levels which had apparently not been reached even in the spring floods in at least twenty years.

6. Temperature Conditions

The summer temperature conditions affecting the distribution of fish are shown on the attached map. It is

evident that there is remarkably little speckled trout or brown trout water in the watershed. The differences in thermal conditions shown result from a variety of causes such as volume of flow, amount of shade, and origin of the water, which cannot be shown on a map of this size. The greatest daily fluctuations in temperature are found in the sections coloured green on the map. These sections have high daily maxima, low daily minima and rather low daily mean temperatures. These sections commonly extend downstream either from cold spring sources or from areas in which there is deep seepage into the streams, i.e., where they pass through cedar swamps over impervious clay. Trout may inhabit these sections in early or late summer, but may move out or be killed in the warm days of midsummer.

The tributary originating near Colles Lake in Lot 19, Con. IV of Burford Township, is relatively cool and is well shaded but has little flow.

7. Pollution

Pollution is not an important factor in Whiteman's Creek, although 32 of the 65 stations showed noticeable pollution by cattle. Recovery from this type of pollution is usually very rapid as the water moves downstream. The condition was severe in only one stream, the lowest western tributary of Horner's Creek in Burford Township.

8. Fish Distribution

The following species of fish were taken in the creeks and tributaries of the watershed during the survey. The distribution of these species is shown on the accompanying map. Further collecting would probably extend the ranges shown.

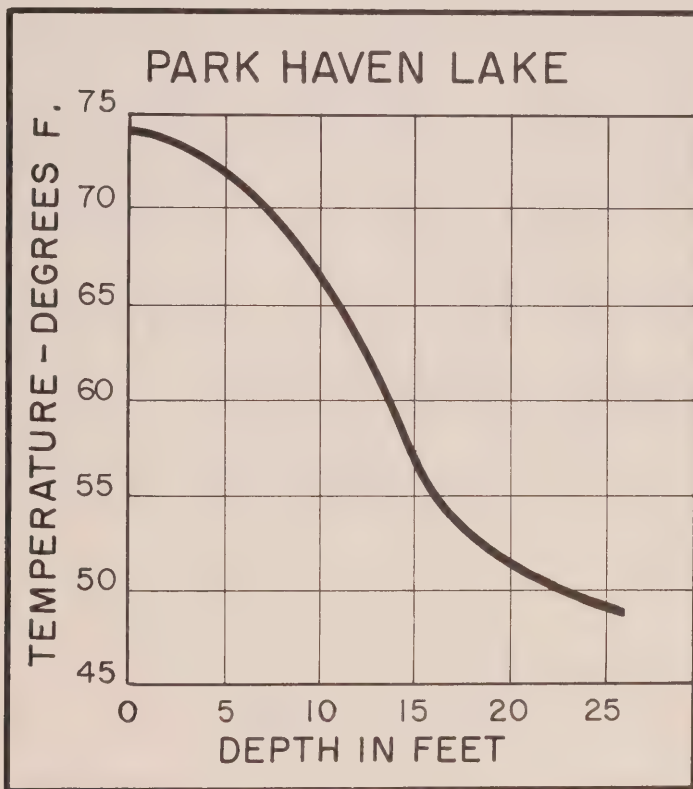
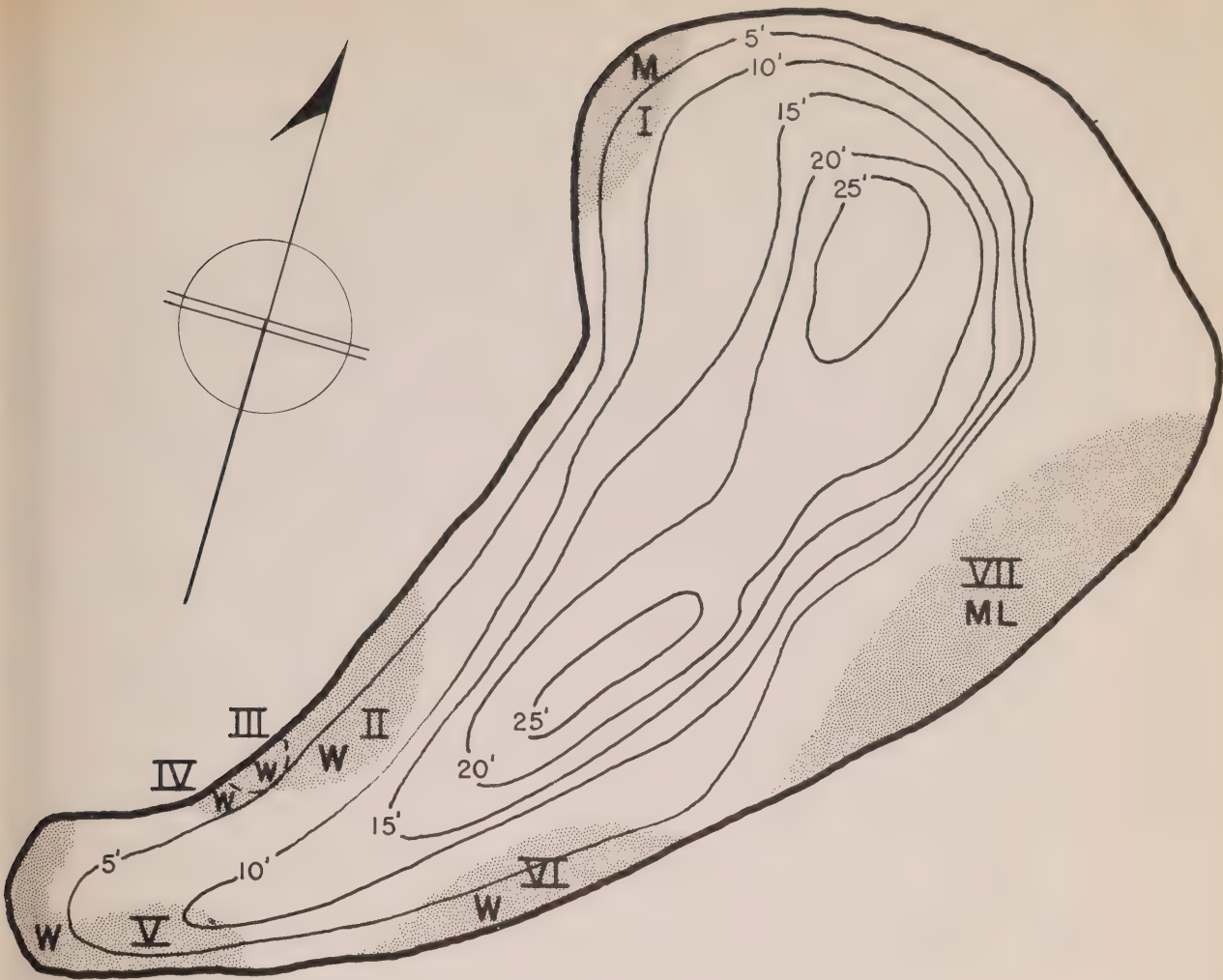
FISHES OF WHITEMAN'S CREEK AND TRIBUTARIES†

(Based on collections during the 1953 survey)

Common Name	Scientific Name	No. of Stations at which the species was taken
*Brown trout	<u>Salmo trutta</u> Linnaeus	2
*Common white sucker	<u>Catostomus commersonnii</u> (Lacépède)	9
Hogsucker	<u>Hypentelium nigricans</u> (LeSueur)	6
*Northern redhorse	<u>Moxostoma aureolum</u> (LeSueur)	5
Creek chub	<u>Semotilus atromaculatus</u> (Mitchill)	24
Blacknose dace	<u>Rhinichthys atratulus</u> (Hermann)	15
Longnose dace	<u>Rhinichthys cataractae</u> (Valenciennes)	4
Redbelly dace	<u>Chrosomus eos</u> Cope	1
Golden shiner	<u>Notemigonus crysoleucas</u> (Mitchill)	1
Common shiner	<u>Notropis cornutus</u> (Mitchill)	32
Blacknose shiner	<u>Notropis heterolepis</u> Eigenmann and Eigenmann	8
Brassy minnow	<u>Hybognathus hankinsoni</u> Hubbs	2
Fathead minnow	<u>Pimephales promelas</u> Rafinesque	10
Bluntnose minnow	<u>Hyborhynchus notatus</u> (Rafinesque)	28
*Brown bullhead	<u>Ameiurus nebulosus</u> (LeSueur)	1
Mud minnow	<u>Umbra limi</u> (Kirtland)	12
*Pike	<u>Esox lucius</u> Linnaeus	2
Yellow perch	<u>Perca flavescens</u> (Mitchill)	1
Johnny darter	<u>Boleosoma nigrum</u> (Rafinesque)	10
Iowa darter	<u>Foecilichthys exilis</u> (Girard)	3
Rainbow darter	<u>Poecilichthys caeruleus</u> (Storer)	15
Fan-tail darter	<u>Catonotus flabellaris</u> (Rafinesque)	14
Least darter	<u>Microperca microperca</u> (Jordan and Gilbert)	10
*Pumpkinseed	<u>Lepomis gibbosus</u> (Linnaeus)	8
*Rock bass	<u>Ambloplites rupestris</u> (Rafinesque)	3
Brook stickleback	<u>Eucalia inconstans</u> (Kirtland)	25

† The arrangement and names follow those of Dymond, J.R. A List of the Freshwater Fishes of Canada East of the Rocky Mountains. Misc. Pub. No. 1, Royal Ontario Museum of Zoology, Toronto, 1947.

* Species of particular interest to anglers are starred.



PARK HAVEN LAKE

JUNE 17, 1953

LEGEND

Aquatic vegetation

Bottom conditions

ML

W Woody detritus

ML Marl

M Muck

SCALE — FEET



It will be noted that rock bass were taken at only 3 stations and brown trout at only 2. The creek chub was found at 24 stations well distributed throughout the watershed. Most of the remaining species are small fish belonging to the minnow and perch families and are not of interest to anglers, except as they furnish food for other species or compete for it.

9. Lakes and Ponds

While there are several small lakes or ponds on the watershed only one was selected for study. This was Park Haven Lake which is in Lots 2 and 3 of Con. IV of Blenheim Township. A sketch of this lake is included showing the depth contours, bottom conditions and temperatures at different depths as of June 20, 1953.

PARK HAVEN LAKE

Sector Number on Map	Bottom Material	Chief Aquatic Vegetation
I	Muck	<u>Potamogeton sp.</u> <u>Typha latifolia</u> , <u>Nymphaea sp.</u> <u>Carex sp.</u>
II	Woody Detritus over Muck	<u>Vallisneria americana</u> , <u>Scirpus sp.</u> <u>Potamogeton sp.</u>
III	"	<u>Nymphaea sp.</u>
IV	"	<u>Typha latifolia</u>
V	"	<u>Vallisneria americana</u> , <u>Nymphaea sp.</u> <u>Hippuris vulgaris</u> <u>Typha latifolia</u>
VI	"	<u>Scirpus validus</u> <u>Nymphae sp.</u> <u>Typha angustifolia</u> <u>Algae</u>
VII	Marl	<u>Chara sp.</u> <u>Nymphae sp.</u> <u>Potamogeton sp.</u> <u>Vallisneria americana</u> <u>Scirpus validus</u>

10. Stream Improvement

In its present condition there is little water suitable for good growth of game fish in the streams of this watershed. The present survey was a reconnaissance survey only and cannot be expected to provide detailed plans for improvements of the several types of streams. It is a common belief that all that is needed to restore streams to their former productivity is that large numbers of trout or small-mouth bass fingerlings or fry should be introduced into them. The known facts do not substantiate this theory.

In most streams of Southern Ontario, since they become gradually warmer and often more silted, downward from their sources, the first requirement is that the sources be protected. On this stream, the condition of the spoil banks on the upper part of Horner's Creek is not good, i.e., their slopes to the stream are too great and erosion is common. Re-working of some of these spoil banks to a gentle slope, and the sowing of various grasses on these new slopes, would certainly reduce the bank erosion. For bank erosion control the planting of fragile willow (Salix fragilis), which does not tend to spread out into the fields, is recommended. In areas where stone piles are available these can be transported to the streamside, where rip-rap can be placed at locations, such as severe curves, where extensive undercutting and bank erosion would otherwise occur. Rounded boulders are not nearly as efficient as angled ones in the matter of staying in place under strong water pressure. The temperature of the stream cannot be reduced unless much of the south and west banks is planted with willow or alder cover for shade.

The Conservation Authority could greatly stimulate stream improvement by sponsoring the protection of a short stretch of stream course, as a demonstration of what can be done. It is important in such a demonstration that an easement be arranged with the farmer so that the section improved is either fenced from cattle or at least that cattle be prevented from trampling the banks of the stream.

There are two types of demonstration needed. One of these would be on a ditched stream, the other in good trout water with a steep gradient and mixed gravel and silty bottom with fair fish cover.

In the northern part of the watershed any section of ditched stream which could be improved by alteration of the spoil banks or by construction of a new ditch with properly angled spoil banks would make an excellent demonstration of what can be done, both to protect the farmer's property and to reduce silting further downstream and improve the fish habitat.

A detailed examination of two examples of the second type of habitat was made. The first of these was on Horner's Creek at Con. II of Burford Township. Parts of the stream have a good gradient, but much of it is as shown in the lowest photograph on the following page showing the high-cut bank erosion. This is typical of the less steep parts of the creek where it runs through sandy land. Many of the banks are higher than the example shown. In February, 1954, the creek overtopped this bank by two or three feet. The river runs in a series of meanders and there is extensive bank erosion, ranging to ten feet in height, on every curve. It was clear from the effects of the flood of February 1954 that this is not the kind of stream where any improvements would be practical without extensive upstream conservation measures for water control. The removal of sand from the outside of each bend and its deposition in sand bars lower down the stream tend to widen the river's course to the point where it is too shallow in summer to provide fish cover.

The Burford stream, one and a half miles north-east of Burford, has had several devices placed in it with a view to improving the fish habitat. Some of these devices, particularly the deflectors of rounded stones shown in the lower photographs following page 13, were moved and their effects much reduced, in the spring flood of 1954. It is therefore clear



The typical condition of ditched streams with eroding spoil banks, at the north end of Horner's Creek. When photographed this stream's flow was much above the normal summer level.



Alternating rapids and shallow pools in Horner's Creek, four miles south of Princeton. The stream is well shaded, but there is a shortage of cover in the water itself.



The typical condition of bank erosion with high cut banks on the outside of each bend of Horner's Creek in the area near Princeton.

that the boulders selected should have been larger. The two small dams remained in place although the one on a curve, shown in the middle photograph on the following page, was affected by bank erosion at the left or west side, and the dam was partly undercut. This type of structure should always be placed on a straight stretch of stream.

11. Farm Fish Ponds

There is ample room for improvement of this type of fishing. The chief research on management of farm fish ponds has been carried on in southern and warmer climates, and therefore the findings cannot be applied without qualification to an area having the climate of Southern Ontario, but some definite recommendations may be made. Suitable methods for the construction of six types of farm pond are given in a bulletin, "Farm Ponds", which may be obtained from the Grand Valley Conservation Authority.

From the fisherman's point of view, farm ponds are of two main kinds.* The first is the cool pond with continuous inflowing water and maximum temperatures at the surface of about 75° Fahrenheit with cooler bottom. Ponds of this type are usually successful near the headwaters and may range in size from about an acre to 8 or 10 acres. Depth should be 10 feet or more in the deepest part. Spring flow of as low as half a cubic foot per second will maintain a pond of one acre. This type of pond is best adapted to the production of speckled trout or brown trout. These species of trout do not normally reproduce in ponds and must be maintained by periodic restocking. Ponds cold enough for trout should not be stocked with mixed types of fish.

* An excellent handbook on the details of construction and management of farm fish ponds is "Fish Ponds for the Farm" by F. C. Edminster, published by Charles Scribner's Sons, New York, 1947. Some of the above information is abstracted from this bulletin.

Submerged logs provide good fish cover in a few stretches of Horner's Creek. These are three miles south of Princeton.



A stream improvement project on the Burford stream. This is a very unusual location for a dam on a curve. Most stream improvement dams are placed on straight stretches. In a location such as this the dam has to be exceptionally well keyed in to the bank.



A small double wing deflector intended to narrow and deepen the Burford stream. This is an excellent type of stream improvement, but the size and shape of stone used must be chosen to withstand the heaviest floods expected. In this case the high water of January, 1954, completely altered the location and function of the stones.

The second and commoner type of farm pond is the warm-water pond. Most farms have at least one low spot suitable for a fish pond. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in the fish pond.

In managing warm-water ponds for fish the following points should be kept in mind.

(1) A minimum depth of 15 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(2) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(3) It is often necessary to control existing aquatic vegetation. There are both mechanical and chemical methods available.*

(4) There have been few tests made in Ontario of the efficiency of applications of fertilizer in increasing the crop of plankton, the smaller aquatic invertebrates. The research now being carried out in this field may lead to application of fertilizers such as 8-8-4 becoming more general.

(5) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species in this province will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of large-mouth bass (Huro salmoides) and bluegills (Lepomis macrochirus) at the rate of 100 bass and 1,000 bluegills per acre. Fishing should be deferred until some of each species have spawned successfully.

Speirs, J. Murray. Summary of Literature on Aquatic Weed Control. Canadian Fish Culturist, 3:(4); August 1948.

LAND

CHAPTER 1

THE LITTLE VALLEY

1. Why Talk About Soil and Water Conservation?

We talk about conservation because we want to make the best use of our land, not only for ourselves for the present, but for all the people for all time. The best of equipment for tilling the soil and harvesting crops is available. Good seed and fertilizer are commonly used and there is protection in some form or another against most of the diseases and pests that infest our crops. So long as markets are available with fair prices, the picture, on the whole, is fairly rosy. The use of the land depends on the fertility and tilth of the soil and the supply of rain and ground water.

Our soils are naturally quite fertile and, on a yearly basis, the rainfall is usually adequate. Loss of fertility and organic content, compaction and poor tilth, wind erosion, water erosion and rapid run-off, however, remain as a constant threat. The extreme cases which lead to withdrawal of land from cultivation are obvious. The less extreme cases are not so obvious but are still critical in a farm economy which must maintain a high degree of efficiency to stand up to competition.

Along with loss of soil values are found other ills; dry stream beds, channels filled with silt, polluted water, floods, and ground water supplies inadequate for present day and future demands. More complex is the problem of retaining a balance in nature to preserve species of wildlife which are beneficial in pest control as well as providing game.

While some land is gradually losing its original tilth, fertility and topsoil, other land is deficient in one respect or another. Well drained, easily worked soil may be naturally deficient in soil nutrients which can be made up by using artificial fertilizer. Stony or bouldery land can be highly productive when enough stones are removed

to allow powered, mechanized farming. Much of the most fertile land is naturally too poorly drained for intensive use without artificial drainage.

A great many things can be done to prevent loss of fertility, fibre, topsoil, tilth and moisture. Much can be done to increase productivity of some soils. Measures can be taken to heal the worst ills. Much can be done to control water for our advantage. Before a program is started we should find out what the situation is. That is the purpose of this report: to show what conditions are and where special measures can be taken to conserve soil and water.

2. Why Study a Little Valley?

Why is a little valley chosen to carry out a program of soil and water conservation? There are two reasons. The first reason is the supreme importance of water. The second is the community aspect of conservation.

Conservation has been defined as "the best use of all our resources for all people, for all time". This definition distinguishes between measures that benefit only the operator - for instance, in increased crop yields, and those which benefit others - for example, improved stream flow. These can be called "on site" and "off site" benefits. The greatest total benefit is obtained from a community effort. In so far as all those who live in one valley share the resources of that stream they constitute a community which recognizes a common problem and can put forth a common effort.

All life depends on water. The best farming practices are useless without water, and they show benefits only in proportion to a favourable moisture supply. Water is also necessary for humans and stock, for sanitation, cooling, fire protection and to facilitate sewage disposal. On the other hand, water can be very damaging, causing erosion, floods, gullying and destruction of property on stream banks. It must be controlled.

All our water comes as rain, snow or dew. Together these sources are called precipitation. Accounting for the water supply is called the RUN-OFF cycle. An understanding of the run-off cycle is necessary for control of this vital resource.

Precipitation may follow any of the following routes. It first recharges soil moisture whence it may be lost again to the air by evaporation or by transpiration by plants. Excess over soil requirements may run overland as surface run-off or in streams. Some may go deeper into the soil, thence to streams by way of springs and seepage. The deepest penetration may recharge ground water which has been depleted during dry spells due to underground flow to streams or upward capillary movement to replenish soil moisture.

Water may be stored in the soil, in ground water or on the surface. Surface storage and overland flow, as in streams, can be lost by evaporation. Some precipitation can be lost directly by being intercepted and lost to the air. This is particularly the case with snow which may rest on evergreen boughs and be evaporated directly without touching the ground.

Water conservation means provision of storage, slowing down run-off and encouraging water to enter the soil. It also means reducing evaporation and, where possible, controlling transpiration by using crops which are most economical of moisture.

Many of the features of land management that are called "conservation practices" are related to one or other of the phases of the run-off cycle. They are designed to control and make the best use of moisture. The ultimate measure of the success of these practices is the quality and quantity of flow in the stream and the response of the crops.

The importance of water and of community effort are, therefore, the reasons for making a small watershed, or "little valley", the working unit in a soil conservation program.

3. How the Valley Was Chosen

The Valley of Horner Creek was chosen because it has a variety of soil types and conditions and includes a variety of land uses, from cash cropping for tobacco and rutabaga to dairy and beef farming. Lessons learned from a study of this valley have wide application in the Grand Watershed.

4. The River and Its Drainage Basin

Horner Creek rises in the south-east corner of Perth County near Shakespeare and flows about 28 miles south-eastward to a point 2 miles east of Cathcart, where it joins Kenney Creek to form Whiteman Creek which flows into the Grand between Brantford and Paris.

The drainage basin is about 25 miles long and varies in width from 1 to 6 miles. The narrowest portion of the watershed is just south of Bright about midway between the source and mouth of the stream.

The average gradient of the stream is about 12.5 feet per mile (between 1,200 and 850 feet above mean sea level). Below Bright there are no branches of importance but from the source to Concession XI, Lot 5, Elandford Township, there are two branches of almost equal size.

North of No. 97 Highway the stream is extensively ditched and flows through cultivated land, but south of No. 97 it flows through flat swampy wooded valleys known as spillways. These spillways were formed by meltwater from glaciers which covered the area some 30,000 years ago.

As the entire watershed was considered to be too large an area to form a community, the survey was carried only as far south as No. 2 Highway, the boundary between Brant and Oxford Counties.

The area under study contains about 44,000 acres of which 64.5 per cent is cultivated, 15 per cent is forest. Permanent pasture covers 14.1 per cent of the area and 3.6 per cent is idle. Other uses including farmsteads, orchards and urban areas comprise 2.6 per cent of the watershed.

CHAPTER 2

SOILS OF THE WATERSHED

1. Methods of Survey

A sample area was chosen on which to conduct a detailed analysis of the present condition of the soil. These blocks were picked with a view to obtaining a representative sample of all the soil types occurring within the watershed. Approximately 2,600 acres were surveyed in this manner but the soil conditions were representative of those within the watershed.

The soil type, average slope of the land and the degree of erosion were determined. These features as well as the present use of the land were mapped on aerial photographs. With the information thus obtained it was possible to apply a capability rating to all of the land within the watershed and to determine a program of recommended utilization. The entire watershed was traversed on foot and the land classified.

Stream and field ditches were located and mapped, as were gullies and intermittent watercourses.

2. The Soil Profile

The soil is made up of distinct levels called horizons. These horizons have developed from the interaction of climate, plants and animals on the surface mineral matter which, in Southern Ontario, is of glacial origin. Different types of soil are identified by the varying physical and chemical characteristics of their horizons. A vertical section through these layers is termed a soil profile. The profile, that is the depth to which roots may penetrate, extends down to the unweathered and unaltered material from which the soil above was formed. This unaltered parent material is termed the C horizon and generally lies at a depth of several feet below the surface. The profile of a typical well drained soil in Southern Ontario is here described.

Horizon

- A - Decayed vegetation
- 0
- A - Dark brown or gray material - loose, friable, containing humus and mineral material. Slightly acid in reaction.
- 1
- A - The leached horizon has no humus. The iron, lime, organic matter and clay have been washed out. Light gray to yellow in colour and dusty in texture. Acid in reaction.
- 2
- B - This is the zone of deposition in which the materials washed or leached from the A_2 accumulate. May be acid to slightly alkaline in reaction. Brown colour and blocky or nut-like structure. Free lime carbonates are found at the bottom of the B horizon.
- C - This is the unweathered parent material. The colour is grayish; and there is no structure as in the B. Free lime carbonates are found.

Decayed plant material or humus is incorporated into the topsoil. Acids are formed during the process of decay and are washed down through the soil by the rain. Lime, iron, organic matter and fine clay particles are leached from the A_2 horizon by the acid solutions and redeposited in the B horizon below. The B horizon, as a result, has a higher clay content and is dark brown to reddish brown in colour. Under cultivation the A_1 and A_2 may be mixed together. The resulting horizon may be called the A_C (cultivated) horizon.

In imperfectly drained soils the A_1 is deeper because the humus does not break down so rapidly when wet. Moreover, when the water table fluctuates near the surface the action of water washing down is not so great. As a result, the A_2 , or leached layer, tends to be shallower and often is entirely absent. When the soil is wet the iron oxides are chemically reduced and have a blue-gray colour instead of the characteristic brown colour of a well drained soil. Thus the subsoil is blue-gray or mottled brown and gray.

3. Soil Types*

The soils of this watershed have developed on varied parent materials deposited during the last ice age, some 20,000 to 30,000 years ago. Soils which have formed on similar materials belong to the same catena. There are differences in profile development, however, depending on the natural internal drainage of the soil. Each catena usually contains three members: well drained, imperfectly drained and poorly drained. Each member derives its name from the locality where it was first indentified and described. For convenience a catena is usually indentified by the name of the well-drained member.

The parent material on which the soils have developed in this area can be divided into two parts: Till and Waterlaid Materials.

4. Soils Found on Till Material

This group consists of unsorted sand, silt, clay, stones and boulders which were deposited under or in front of the glacier as it advanced. This material, called till, was plastered over the surface of the area to form a gently undulating plain. There are two main areas of till on the watershed; the larger (22,00 acres) lies north of No. 97 Highway, while the smaller (4,000 acres) lies just north of Princeton.

There are three till catenas on the watershed and they are differentiated by the texture. Dumfries loam is composed of coarse, light till, Guelph loam of medium till, and Huron clay of heavy fine till. The two latter catenas are found in the till plain while the former is found in till moraines, ridges of coarser material pushed up in front of the glaciers.

* The soil maps of Oxford and Perth Counties were kindly made available by the Ontario Soil Survey at the Ontario Agricultural College, Guelph. The terms and names used here are the same as those used by the Soil Survey and by the Soils Department at the College when doing extension work on farms.

5. Soils Found on Waterlaid Materials

Any materials deposited by water which flowed through the ice, away from the ice or which lay in hollows after the retreat of the glacier are found in this group. These materials range from unsorted sands and gravel to lacustrine clays.

These materials are found in the 18,000 acres south of No. 97 Highway and comprise four catenas; Waterloo sandy loam, which is coarse sand and gravel; Fox sand, almost pure sand without stones; Burford gravel, well stratified sand and gravel; and Berrien loam, sand over till or clay. Waterloo soils are found in Kame moraines, Fox soils in sand plains, Burford gravel on spillway terraces and bottoms and Berrien soils on outwash plains.

Muck soils are developed in permanently wet locations.

Soils Series and Types

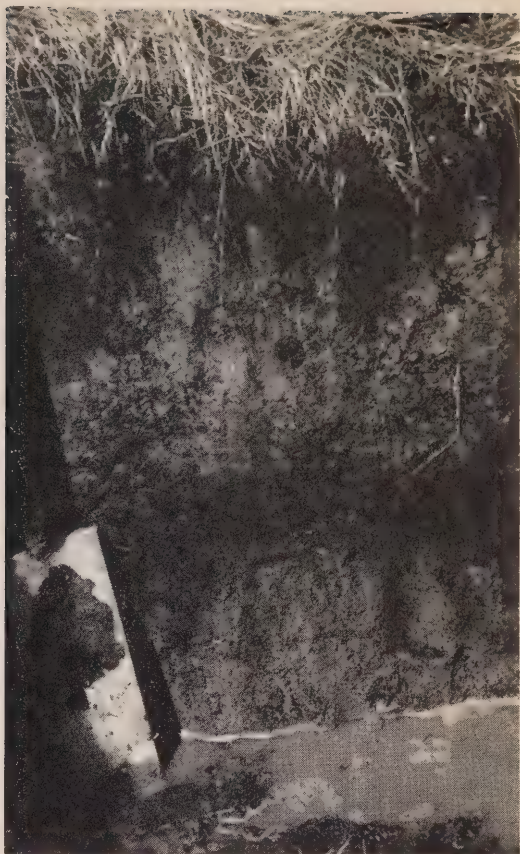
The following table outlines the soil types found on the watershed:

<u>Parent Material</u>	<u>Catena</u>	<u>Series</u>	<u>Drainage</u>
Coarse-textured till	Dumfries	Dumfries loam	Good
Medium-textured till	Guelph	Guelph loam	Good
		London loam	Imperfect
		Parkhill loam	Poor
Fine-textured till	Huron	Huron clay	Good
		Perth clay	Imperfect
		Brookston clay	Poor
Poorly sorted sand outwash	Waterloo	Waterloo sandy loam	Good
Well sorted gravelly outwash	Burford	Burford gravel	Good
		Brisbane "	Imperfect
		Gilford "	Poor
Well sorted sandy outwash	Fox	Fox sandy loam	Good
		Brady " "	Imperfect
		Granby " "	Poor
Sand over till	Berrien	Bookton sandy loam	Good
		Berrien sandy loam	Imperfect
Usually water-laid sands and gravels	Muck	Soils	Very poor.



The coarse, stony Dumfries loam has a deeper profile because moisture can move downward more easily. This soil has a lower fertility level and mineral nutrients are soon leached out of it.

Waterloo sandy loam is relatively stone-free, has a deep profile and requires replenishment with fertilizer and organic content if it is to be used intensively.



The heavy fine-textured Huron clay shows, in this vertical section, the characteristic horizons found in our gray-brown wooded soils. Note the pale coloured, leached horizon between the dark topsoil and dark subsoil. A little of the light-coloured parent material can be seen at the bottom.



7. Soil Descriptions

Dumfries Catena - Soils Developed on Coarse-Textured Till

Dumfries loam is found chiefly in the area south of No. 97 Highway. It is composed of coarse-textured till and is quite stony. It is associated with steeper slopes but due to its coarseness and consequent good drainage there is little evidence of erosion. Conservation can only be carried on by vegetative means. A large proportion of this soil type is found in pasture and some in hay and spring grains.

The imperfectly and poorly drained associates of this type are not extensive on the watershed.

Guelph Catena - Soils Developed on Medium-Textured Till

The Guelph Catena is dominant on the watershed, with the areas of Guelph loam and London loam equal. Considerable drainage has improved the latter to the point where it is almost as fertile as the former. This type supports prosperous farms growing spring grain and hay with smaller areas of winter grain, turnips, corn and pasture. Dairy farming and turnip production are important economic activities.

The topsoil of Guelph loam is a dark gray-brown loam over a light gray leached horizon. The subsoil is a nut-structured brown silt loam or clay loam.

The London and Parkhill soils are imperfectly and poorly drained respectively and can be recognized by a fairly deep dark topsoil with little or no leached horizon, and have mottled subsoil -brown with orange mottling in the London, and gray with orange mottles in the Parkhill. Normally these soils lie in depressions and are not eroded. They may have accumulations of topsoil from nearby eroded slopes. They have been extensively tile and ditch drained and these areas are productive, but where not drained they are suitable only for hay or pasture or late crops. In some cases these soils are found on slopes where seepage lines impede internal

drainage. This land is very liable to erosion as, with downward percolation impeded, surface run-off is at a maximum. Water then concentrates to form gullies. Tile drainage in these cases may be all that is necessary, otherwise grassed waterways should be maintained to carry off excess water.

Huron Catena - Soils Developed on Fine-Textured Till

Huron soils are similar to those of the Guelph Catena except that they are heavier and not as easy to work. They are found in the same areas as the Guelph soils and are used for the same crops. The fineness of the texture impedes percolation and increases the danger of surface erosion on slopes.

Waterloo Catena - Soils Developed on Fine-Textured Till

Waterloo soils are similar to Dumfries soil although they owe their origin to a different mode of deposition. The parent material of the Dumfries was dropped in sites by the melting glacier while that of the Waterloo soil was first interworked by water within the ice before it was dropped. This has resulted in the soil having more sand in it and in the stones and boulders being smooth and rounded. This soil is found chiefly in the south of the watershed and is used for pasture on the steeper land and for tobacco and rye on the more gentle slopes.

Surface run-off is not a problem, due to the open structure of the soil, but there is some erosion on the steeper slopes. For lack of contourable slopes, vegetative means of control in the form of restricted rotation, winter cover crop and grassed waterways are recommended.

Fox Catena - Soils Developed on Well-Sorted Sandy Outwash

This group of soils, found primarily in the southern part of the watershed, is probably the most important economically although it does not cover a very large area. The topography is level to gently sloping and the soils are easily cultivated. Good internal drainage prevents any danger of water erosion but wind erosion is

a danger. The main management problem is in maintaining an adequate content of organic matter in the topsoil.

The danger of wind erosion and lack of organic matter is recognized by the farmers. They carry on extensive strip-cropping, alternating rye and tobacco in long narrow strips.

Brady sand, the imperfectly drained series of the catena, is drained by ditches or tile and is also utilized for tobacco and rye as well as corn, potatoes and spring grains.

Granby, the poorly drained series, is mostly in woodlots or scrub.

Burford Catena - Soils Developed on Well
Sorted Gravelly Outwash

This catena occurs along the side and floors of river valleys and spillways. Most of it is under trees, but where it is cultivated stoniness and fertility maintenance are the most important problems.

Berrien Catena - Soils Developed on Well Sorted
Sandy Outwash over Till

The Berrien Catena is characterized by the fact that within the solum, namely the top and subsoil, there is sand above and till below. For this reason the type soil of this catena is the imperfectly drained Berrien rather than the well drained Bookton. The sand is well drained but the till impedes drainage. Nevertheless Bookton is dominant in the Horner Creek Watershed. It is utilized in the same manner as the Fox sands, for tobacco and rye. The problems associated with it are the difficulty of maintaining organic matter.

Muck Soils

Most of the muck soils of the watershed are associated with Gilford gravel and merely represent a more extreme case of impeded drainage. The water table lies close to the surface. Excess moisture slows down

decomposition of plant matter so that there are considerable accumulations of muck and peat. Like the Gilford series, muck soils have been left under a permanent tree or grass cover.

CHAPTER 3

EROSION AND DRAINAGE

1. The Process of Erosion

When water or wind removes some of the soil it is called erosion. Before cultivation exposed the soil by removing the vegetation, wind erosion was rare and water erosion only slight. The soil-building processes merely developed deeper to make up for what had been lost. Since the soil has been cultivated the rate of erosion has been speeded up. It is this accelerated erosion which is referred to as "erosion" in soil conservation.

The question of erosion is always connected with that of water loss. If water penetrates the soil it cannot run overland and erode soil on slopes, or conversely, if erosion is checked there will be more penetration of water into the soil. The holding of water is just as important as holding the soil. Control of run-off means control of erosion; one necessarily involves the other. Erosion-exposed parent material can sometimes be successfully cropped. But it nearly always is much poorer and often is practically worthless for some crops.

The susceptibility of a soil to erosion is dependent upon a combination of factors. Not only is the amount of run-off important but also its velocity. The latter depends upon both the nature of the slope and the vegetative cover protecting the soil.

Soil bared by cultivation is exposed to the maximum effect of eroding water. Intertilled crops such as corn provide very little protection. Drilled crops, such as the grains, impede run-off to a slightly greater extent. Almost complete protection is afforded only by a permanent sod or tree cover. Grass, in most cases, appears to be as effective as trees in holding soil. The average results of a thousand measurements in the United States show that

under the exposure of clean tillage and fallow, soil is lost at a rate nearly 100 times as rapidly as from corresponding areas safeguarded with a dense cover of vegetation, and that nearly 7 times as much of the rainfall is lost as run-off from cultivated land as from land protected with vegetation. Observations made in Ontario at Ottawa and New Hamburg confirm these conclusions.

Obviously the greater the slope, the greater will be the run-off and erosion. The length of the slope is also important. Long smooth slopes are more susceptible to soil wash than are short hummocky ones.

There are several soil characteristics that influence the ease with which water can penetrate a soil. Coarse sandy and gravelly materials are extremely pervious to water and, if all other factors are constant, will not wash or gully as seriously as will a heavy clay. Sands, however, are more subject to wind erosion. The higher the organic content of a soil, the greater the downward percolation of water. If the friable organic topsoil is lost a heavy B horizon with a high clay content may be exposed at the surface. Tillage is rendered more difficult and water penetration is impeded. At the same time the loss of organic matter and consequent water-holding capacity increase the hazard of drought.

The soil in this area has now been exposed by cultivation for about a century and a half. Only a small percentage has, as yet, undergone really severe erosion. Considerable wash has taken place on all sloping land, however. Looking to the future, one realizes on the basis of past experience that, unless adequate protection is provided, within the next 100 years a large part of the valuable agricultural land is going to be very seriously impoverished by this insidious process.

Cultivation in this new orchard has exposed soil to erosion. The rill and soil wash seen here occurred in one summer storm.



Level topography and stiff soil prevent surface water from flowing away or penetrating to ground water. Artificial drainage is required to improve land use and make best use of available moisture.

This large gully was formed overnight during one storm in a recently worked field. The layout of fields, roads and ditches had concentrated more overland flow than the grassed portion of the natural watercourse could carry.



2. Estimating Erosion

The most obvious evidence of erosion is in gullies. These, however, represent the most advanced stage and it is obvious that a great deal of sheet erosion (soil wash) must have occurred before the gullies formed. Small gullies, or rills, are easy to see in the spring or during heavy summer storms in fallow fields or on slopes sown to intertilled crops. Because they are obscured by tillage implements the rills tend to be forgotten. They are, nevertheless, certain evidence that erosion is taking place.

The effect of erosion is clearly seen in the poor crop response, due to drought, on eroded spots on knolls or on the sides of hills. If severe soil wash has taken place, patches of gray C horizon may be exposed at the surface. When ploughed, patches of this lighter-coloured grayish material will be visible on the steeper slopes. In areas where this is seen other superficial evidence is unusually available. These include the piling up of sediment at the bottom of a hill, accumulation of soil on the uphill side of a fence row and cutting away of soil on the downhill side.

To get a more certain determination of erosion the soil profile must be examined. In an area of one type of soil it is possible to get a fair sample of the soil in old woodlots or along old fence lines. The horizons of an undisturbed profile can thus be examined. Such a profile, for instance, may exhibit one foot of topsoil (A_1 and A_2) and two feet of subsoil. On an adjacent cultivated slope on which erosion is suspected, subsoil may be recognized under 6 inches of A horizon. It is safe to assume that something like 6 inches of topsoil have been eroded away. In a more serious case one might find the subsoil exposed at the surface, and the C horizon or parent material at a depth of only 12 inches. All of the topsoil and one-half of the subsoil have been eroded.

If the recognition of horizons by colour or texture is difficult, a simple chemical test can be used. It has been shown that there are, characteristically, no free lime carbonates in the topsoil or subsoil but that they exist in the parent material. A dilute solution of hydrochloric acid gives effervescence with lime carbonate. In an undisturbed profile it may be possible to get a fizz at three feet, but on an eroded site at two feet. It is then estimated that one foot of the original soil has been eroded away. If the surface soil is a grayish colour and effervesces with acid, all topsoil and subsoil have been removed.

Summary of Soils in Sample Area

	<u>Acres</u>	<u>Per Cent</u>
Guelph, London, Parkhill Loam	1,050	42
Waterloo sandy loam	248	10)
Fox, Brady, Granby sandy loam	123	5)
Burford, Brisbane, Gilford gravelly loam	925)	58 per cent
Muck	146)	43)

Proportion of Each Type Cultivated

(Average for Sample Area 56%)

<u>Type</u>	<u>Per Cent</u>
Guelph loam	84
London loam	57
Parkhill	10
Burford gravelly loam	68
Brisbane gravelly loam	7
Gilford gravelly loam	2
All well drained soils	79
All imperfectly drained soils	31
All poorly drained soils	13
All muck soils	2

Because soils of progressively poorer drainage in the scale are cultivated to a much lesser extent than the average, it would appear that poor drainage is the chief limiting factor in land use. The burden of production must be carried by the well drained, and for the most part sloping, soils. Twelve hundred and thirty-seven acres (about half the land) is sloping and 80 per cent (compared to the average 56 per cent) is cultivated, that is, under regular rotations.

Proportion of Each Estimated Degree of Erosion

No erosion (most is flat and inadequately drained)	on 53%	of the area
Slight erosion	" 24%	"
Moderate "	" 20%	"
Serious "	" 3%	"

Proportion of Erosion on Cultivated Land

No apparent erosion	on 30%
Slight	" " 35%
Moderate	" " 30%
Severe	" " 5%

This further emphasizes the high hazard of erosion on cultivated land. For instance, although moderate erosion can be found in only 20 per cent of the sample area, 30 per cent of all cultivated land is at least moderately eroded.

Consideration of the observations summarized in the table of soil conditions and land use gives the clue to the capability of the soil.

The Guelph loam, flat and not or only slightly eroded, is nearly all cultivated. That is, it is recognized as being the best soil available.

On slopes up to 6 per cent the only soil not eroded is in a woodlot. The remainder is slightly eroded (219 acres) and moderately eroded (233 acres). On slopes

between 6 and 10 per cent, 12 acres are slightly eroded, 60 are moderately eroded and 21 are seriously eroded. That is, the degree of erosion increases sharply with increase in slope

3. Detailed Survey of Soil, Slope and Erosion on a Sample Area to Determine Use Capability

A detailed analysis of soils, slope, erosion and land use was carried out on approximately 2,600 acres of land chosen as being representative of the watershed as a whole. Sixty-nine per cent of the land was level to very gently sloping. Of this 1,808 acres of level land, 29 per cent showed no appreciable erosion, 69 per cent showed slight erosion and 2 per cent showed moderate erosion. Seventy per cent (70.4%) of this land is cultivated. On the other hand 79 per cent of the sloping land is cultivated. In view of the fact that 61.9 per cent of the level land is not well drained and only 10.8 per cent of the sloping land is not well drained, the artificial drainage of the area seems to have been carried fairly far.

Eighty-six (86) per cent of the cultivated land had suffered slight to moderate erosion compared to only 56.8 per cent of the uncultivated land. Cultivated land was 14 per cent uneroded and 15.5 per cent moderately eroded.

Proportion of Each Estimated Degree of Erosion

	<u>Total Area</u> <u>%</u>	<u>Cultivated</u> <u>Land %</u>
No Erosion	21.7	14.0
Slight Erosion	65.7	70.5
Moderate Erosion	12.5	15.5
Severe	-	-

4. Estimating Use Capability

The best indication of the use capability of the soil is the present use. The accumulated experience of generations of farmers is reflected in the choice they now

make of each type of land for each use. In general, the most intensive use of the land will be on those soils which experience has shown are the best. The poorest soils are left in woodland or pasture or, if previously cropped, have deteriorated and reverted to sod or trees.

When the use of each type of land (on a basis of soil type, slope and erosion) has been ascertained a simple computation is made to find which is the most intensively used, the next most, and so on. That is, what kinds of land are "preferred" for the greater use. Of course some good land may be in a lower use simply because of the slopes of the fields not conforming to the natural boundaries. Some land of lesser capability may be used because the landholder has not enough land of high capability to carry his heaviest demands for field and cash crops.

On the basis of this analysis all land was classified to fit it into the following "Use Capability Classifications".

5. The Land Use Capability Classifications

To plan the use of land for a soil and water conservation program, it is necessary first to classify it in terms of its use capability. The system of classification which has been used here was devised by the Soil Conservation Service of the United States Department of Agriculture. This same system has been adopted by the Soil Advisory Service of the Soils Department of the Ontario Agricultural College in laying out plans for conservation farming on individual farms.

Conservation is using each acre according to its capabilities and managing it according to its needs. With respect to the soil and agricultural use this means adopting crops and tillage methods which will get the most out of the soil, while at the same time fertility, moisture absorption and resistance to erosion are maintained.

The capability of the soil is rated in three main groups as follows:

- A - Suitable for Cultivation
- B - Suitable for Occasional Cultivation
- C - Suitable for Permanent Vegetation

The features which downgrade the soil are low inherent fertility or droughtiness, slope and susceptibility to erosion and water loss, inadequate drainage, and boulderiness and rough topography which limit the use of tillage implements. Most of these were observed in the sample area.

The three groups are subdivided as follows:

A - Suitable for Cultivation -

Class I - Without any special practices over and above good farming.

Class II - With moderate restrictions in use or simple practices.

Class III - With severe restrictions in use or intensive practices.

B - Suitable for Occasional Cultivation -

Class IV - With limited use and intensive practices.

C - Suitable for Permanent Vegetation -

Class V - With no special restrictions or special practices.

Class VI - With some restrictions in use or special practices.

Class VII - With severe restrictions in use or special practices.

6. Recommended Use And Management

The land use capability classes may be converted into classes of recommended use by indicating which special practices and restrictions are required to adapt the use of the land to its capability. These special practices are indicated by the letters C, R, D, T and P following the capability class. C, R, and D are used in conjunction with classes II and III and T and P are used with class IV.

Recommended class C applies to smoothly sloping land whose capability is reduced by erosion (or susceptibility to erosion) which can be corrected by mechanical means. Mechanical conservation practices include contour tillage, diversion terraces, strip-cropping, buffer strips and the like.

Vegetative conservation practices such as restricted rotations, winter cover crops and the like are grouped under the recommended class R, while class D indicates that drainage will improve productivity.

Class T indicates that the land is too rough or eroded for regular rotations and class P is used where the land is too wet for rotations.

7. Recommended Land Use Classes

Land Class I

Of the 44,610 acres in the area, only 0.13 per cent are in land class I. It occurs on well drained soils, particularly Guelph loam where slopes vary from 0 to 2 per cent. This type exhibits no erosion and may be cultivated freely in any regular rotation with no restrictions or special practices beyond what is now considered to be good farming practices.

Over one half of the area in class I land is in hay which is a much less intensive use than the land class is capable of.

Land Class II C

This class again occurs principally on Guelph and Huron loam and comprises about 2.15 per cent of the entire area. Smooth slopes of from 2 to 6 per cent which are capable of contour cultivation are associated with this type. Conservation practices on this type include contour cultivation, strip-cropping and diversion terraces. Slight to moderate erosion has usually taken place.



Land of Class II capability of two types: level, requiring artificial drainage (IID), and slightly hummocky, requiring some slight measure of erosion control by vegetative means (IIR).



Class II R land in the foreground and III R in the background. Hummocky land subject to erosion can be controlled by vegetative cover on the soil.



Class III R land, hilly and subject to erosion. Crop rotations, which include more sod crops than grain, and excluding intertilled crops, are the recommended practices on this land.

About 51 per cent of II C land is in spring or winter grain, while about 23 per cent is in hay and 12 per cent in pasture. This type is also used less intensively than it might be.

Land Class II R

Land class II R is dominant on the watershed, comprising 34 per cent of the total area and 45 per cent of the cultivated land. This land class is found on Guelph, Huron, Fox and Bookton soils with hummocky land with slopes ranging from 2 to 7 per cent. Hummocky land is unsuitable for contour cultivation so that conservation measures must include extended rotations, winter cover crops and restrictions on row crops, especially on steeper slopes.

Eighty-eight per cent of the II R land found on predominantly till soils (e.g. Guelph and Huron) is cultivated while only 82 per cent of that found on predominantly water laid materials (e.g. Fox and Bookton) is cultivated.

Land Class II D

This class occurs chiefly on imperfectly and poorly drained soils: London, Parkhill, Perth, Brady, Granby, Berrien. For this type, which comprises 30.5 per cent of the watershed, simple methods of field drainage are recommended. Actually, a great deal of ditching and tiling has been carried out. There are about $42\frac{1}{2}$ miles of ditches and ditched streams in the area.

Of all of the cultivated land on the watershed, this type accounts for 39.5 per cent. This makes it the second most important type after II R.

Land Class III C

Only 47 acres or 0.1 per cent of the watershed are found in this type. It is found on smooth slopes ranging from 6 to 10 per cent and composed of Guelph soils. Intensive measures will halt erosion. Contour tillage, strip-

cropping, diversion terraces and grassed waterways are recommended.

Land Class III R

III R land composes 5.7 per cent of the watershed and accounts for 7 per cent of all the cultivated land. It is found on hummocky slopes of from 7 to 15 per cent. The predominant soil types are Dumfries, Waterloo and some Guelph and Burford. Intensive restrictions in crop rotation are required to prevent widespread soil erosion. A four-or five-year rotation of grasses and legumes for 3 to 4 years and one year is recommended with winter cover crops on the exposed slopes.

Land Class III D

Found principally on Parkhill and Brookston Granby soils. There are outlets available for its drainage but they would be costly to develop. This type comprises about 1.7 per cent of the watershed.

Land Class IV T

Rough land and severe erosion is characteristic of this type with smooth slopes of over 10 per cent and hummocky slopes of over 15 per cent, this land should be sown to improved pasture. Sod should be broken only when reseeding becomes necessary. Very occasionally crops of grain and hay may be sown. Only 1.1 per cent of the watershed is in this type.

Land Class IV P

1.4 per cent of the watershed is in this land class. It occurs on imperfectly and poorly drained soils which are incapable of being drained. The land can be put into permanent pasture using species adapted to wet conditions.

Land Class V

The flat floors of river valleys and poorly drained locations are the areas where class V land is found.



Class IV T land, with class VI land on hills on the skyline, have highly erosible soils not suitable for regular cultivation. Sod cover, with only occasional cultivation on the class IV, is the recommended practice.



Class V land is bottom land or muck suitable for permanent cover of sod or trees with no special practices or restrictions in use required.



Rye and tobacco in a two-year rotation and alternated in strips in a field constitute good production and soil conservation. Danger of wind erosion is reduced by strip-cropping, straw mulch and building organic content of soil.

No special practices are required except fencing to exclude grazing cattle. About 7.3 per cent of the watershed is in this type.

Land Class VI

Excessively steep and excessively eroded land falls into this class which comprises 0.7 per cent of the watershed. This land should be in trees or permanent grass and if in the latter, intensive practices should be carried out.

Forest

Only the cleared portions of the watershed are dealt with above. Fifteen per cent of the area is under forest and most of the land is either V or VI class land although there are small areas on higher class land. Seventy per cent of the forest is found on the water-laid materials in the south part of the watershed, especially the wet land of the spillways and the steep land of the kame and till moraines.

Present Use	Recommended Use Classes											Water	Totals	Per Cent
	F	I	II C	II R	II D	III C	III R	III D	IVP	IVT	V	VI		
Forest (F)	6,684												6,684	15.0
Spring grain (Gs)	12	382	3,948	4,388	10		499	76	79	61	117	19	9,591	21.5
Winter grain (Gw)	6	104	2,886	1,448			435	33	45	83	57	27	5,124	11.5
Hay (H)	35	220	3,454	4,191	7		561	300	75	128	127	17	9,115	20.4
Farmstead (N)		44	500	352	1		82	3	6	16	29	7	1,040	2.3
Orchard (O)		6	33	39			1	2			1		82	0.2
Pasture (P)		114	1,522	1,664	22		406	159	216	134	1,943	128	6,312	14.1
Hoe crop (R)		32	2,003	607			430	89	44	59	50	6	3,320	7.4
Fallow (T)	7	42	678	766	7		84	23	10		41	12	1,670	3.7
Urban (U)		15	19	6			8						48	0.1
Idle (X)		1	124	222			26	54	156	13	902	105	1,603	3.6
Water												21		
Totals	6,684	60	960	15,167	13,683	47	2,532	739	631	494	3,267	325	44,610	
Per Cent	15.0	0.1	2.1	34.0	30.6	0.1	5.7	1.7	1.1	1.4	7.3	0.7		100.0
			Class II 66.7%			Class III 7.5%			Class IV 2.5%					

CHAPTER 4

CONSERVATION PRACTICES

1. Introduction

The first step in planning for soil and water conservation is to arrange the cropping and rotations so that each piece of land is used strictly according to its natural capabilities. To do this effectively a plan is required, based on the types of soil and soil conditions on each part of the farm. Its purpose is to indicate what each part of the farm is best capable of producing. The second step is to maintain soil fertility, check soil erosion, rebuild topsoil where it has been lost by erosion and to check gullies and protect waterways against gullyng. The third step is to use crops and tillage methods which will make the best use of the available moisture, that is, to keep soil well drained and to make water go into the soil rather than run away.

Using the capability plan as a guide, the second and third steps are accomplished by using cultural and mechanical methods of farming. Cultural methods include such practices as extended rotations, improved pasture, and the use of green cover crops. The proper management of the woodlot also comes under this heading. Mechanical methods include drainage, farm ponds, contour ploughing and strip-cropping, terraces and grassed waterways. These cultural and mechanical methods of farming are described in detail in the following pages.

2. Crop Rotations and Cover Crops

A crop rotation means following a regular sequence of crops on a field with the same sequence repeated every three or ~~more~~ years. Cover crops are those crops which are planted mainly for the purpose of protecting or rebuilding the soil.

Building soil by keeping fields clean, adding nitrogen and making best use of soil nutrients, is fairly well understood and commonly practised.



Both spring and fall grains are grown on the watershed. Nearly level, well-drained land like this can be intensively farmed with no special practices to combat erosion. Spring grains can be grown on land with inadequate natural drainage but on heavy, imperfectly drained soils artificial drainage is necessary for growing fall grain.



A well-planned crop rotation is the most effective soil conservation measure on much of the land. The layout on this farm illustrates the point.

Good pasture management, including clipping to control weeds and rank growth, is a very important conservation practice, especially on rolling and hilly land, which is particularly suitable for long-term pasture.



This system of farming has two advantages: one is directly related to yields and quality, the other advantage is related to building and protecting the soil. Repeating certain crop and tillage practices rapidly depletes the soil nutrients, destroys its tilth, reduces organic content and exposes it to erosion.

The advantages of a rotation system include: the drawing of plant nutrients from different levels, the use of deep-rooted crops to bring up nutrients from lower levels, addition of fibre by ploughing-under crop waste, and improvement of tilth by alternative systems of tillage.

In this report, in which conservation is being stressed, the value of crop rotations and cover crops depends on their ability to rebuild the soil, protect it from erosion, maintain organic matter, add nitrogen and keep the soil in good tilth. The soil is required not only to provide a good medium for the roots of plants and a generous supply of nutrients, but should be the best possible medium for absorbing and retaining moisture.

Crop rotations and cover crops, therefore, become one of the most important tools of the conservationist. Crops may be classed as soil-building (the grasses and the legumes) and soil-depleting (grain, corn and root crops). Of the latter the intertilled or hoe crops, corn, beans and roots, exhaust the soil most rapidly and expose it the most to erosion and drought. The conservation farm planner arranges the cropping systems field by field, so that the land of lower capability, subject to erosion, has more of the soil-building and less of the soil-consuming crops. Land subject to serious erosion has the hoe crops excluded from it almost entirely.

To get the greatest advantage of this system, the farm must be carefully planned, so that the land of highest capability is able to carry the necessary amount of grain, corn

and roots. Wise use of the best land is, therefore, an important feature of conservation.

In extending a rotation from, say, three years to five years, so that there are three years of soil-building crops and only two years of grain or corn, the proportion of grain or corn on the farm may be much lower. The yields, however, may be higher per acre because the soil is in better condition.

Extended rotations and the use of cover crops such as winter rye, following summer ploughing, keep the soil under a protective covering throughout that time of the year in which erosion is most serious.

3. Improved Pasture

A long-term improved pasture is one that is seeded to grasses and legumes and left for five years or more. It may be renewed by reseeding with or without the use of a nurse crop such as oats. Actual production of field crops is eliminated or kept to a minimum. Thus, the soil is kept under protective cover at all times and is carrying soil-building crops, namely grasses and legumes.

Too much stress cannot be put on the use of good pasture. In both beef and milk production, the grass of the field is the basis of the largest part of production. The carrying capacity in animals per acre or the yields, in tons of forage, pounds of meat, or gallons of milk, can be increased very considerably over what is commonly accepted as ordinary pasture. Pasture should never be considered as merely a lesser use of land but should be considered as a crop which gives generous returns for the capital and labour put into it. The improvement of pastures for the sake of higher production is being carried out in many instances, strictly for economic reasons, chiefly the shortage of labour.

There is no need to dwell on this aspect of pasture in a report on conservation, but the importance of pasture to control erosion and to improve the moisture relations is overlooked and needs to be stressed here. Grasses and legumes rebuild the organic matter in the soil, protect it almost completely against erosion, do as much as any other measure in making the rainfall go into the soil so that it is protected from drought, and the ground-water levels of water are maintained to the advantage of springs and streams.

Specific recommendations for the preparation and seeding of pastures can be obtained from bulletins distributed by the Departments of Agriculture. Soil tests and application of fertilizer are just as important as they are for any field crop or cash crop. A point which has been overlooked has been the use of improved pastures on land of lower capability. They may give as good a return in grazing as the best fields and the best land and, at the same time, protect the soil.

Management of pasture after seeding and in the years before it is renovated is extremely important, not only to maintain production but to get the best return from the initial expense in working, seeding and applying fertilizer.

Repeated clipping of pastures is an important feature of pasture management because it keeps the turf thick to give protection to the soil, keeps down weeds and maintains the grass in the most palatable and nutritious condition.

Another feature of pasture management is applying fertilizer. This may be in the form of a dressing of manure or the application of commercial fertilizers, particularly those high in phosphates. Occasionally raking a pasture to spread out the animal droppings makes the pasture more agreeable to the animals and makes the best use of their droppings for fertilizer.

Where possible, it is an advantage to rotate the herd in a pasture so that a few acres are grazed intensively while other acres are recovering their growth. This may be done by using electric fencing, and about the only limit to this practice is the availability of water for the stock. With respect to the watering and the location of salt licks, they should be arranged, particularly in hilly country, so that the cattle do not follow the same path regularly, for such paths can soon turn into gullies.

In good pasture management, the animals are not left out to the very last thing in the fall. If the grass is allowed to grow a bit before frost comes, the soil is better protected during the winter and the grass gets off to a better start in the spring. Grazing thus sacrificed late in the year can be made up for by browsing on winter grain or by use of silage or other fodder.

4. Contour Cultivation and Strip-Cropping

Strip-cropping on the contour consists of laying out row crops (grain, corn and roots) with alternate strips of close-growing crops (grass and legumes), with all strips laid out at right angles to the slope, or "on the level". Contour cultivation is a simplified method in which a field may be sown to one crop, but cultivation is all done around the hill rather than up and down the slope.

Soil wash, rills and gullies are obvious evidence of soil erosion. Wheel tracks, furrows and drill rows tend to concentrate overland flow of water. Not only is valuable topsoil lost and the field scarred by gullies, but rainfall which might have replenished soil moisture and recharged ground-water levels is lost. The eroded soil is less able to absorb moisture and the results are seen in drought and lower yields.

Furrows on the contour each act as a little dam. Water is induced to go into the land and leave the soil in place. There are no erosion scars to be worked over and the soil keeps its tilth, its moisture and its productivity.

Where there are strips of grassland alternating with fallow, drilled or hoe crops, a further check is provided. If any soil or water is washed from exposed soil it is trapped by the grass on the sod strip. The soil under the sod does not become sealed and compacted by the impact of rain, and moisture can go into the soil more easily.

The increased yields, measured in dollars and cents, due to more moisture, better soil and greater fertility, are not the only benefits of this kind of farming. Ease of operation and lower fuel costs for power make it a worthwhile system. Yields have been proven to increase 10 per cent, all other things being equal, by contour cultivation, due mainly to better use of moisture. Fuel costs in tests have shown 17 per cent savings in working on the contour.

5. Terraces

Terraces are broad, shallow ditches running across a slope with side grades gentle enough to allow implements to work over them. They may be cultivated or left in grass. Their purpose is to break a long or steep slope so that overland flow of water down the slope is checked, forced to penetrate the ground, and the surplus is diverted at lower speed across the slope. They have a slight downhill gradient, just enough to carry the water away. They empty surface water into a watercourse or structure in which it can be carried safely away.

Terraces prevent serious erosion on lower slopes where water otherwise attains great velocity and erosive power. They get more water into the ground. Terraces deliver heavy flows of water harmlessly to natural waterways.

Terraces may be combined with contour strips and tillage or may stand on their own. Once a long slope has been divided into two short ones by means of a terrace, there may be no need to carry out other intensive practices of contouring.

Some broad-based terraces for diverting run-off have been built in Ontario using special equipment such as a road scraper or an implement called a Whirlwind Terracer. A few demonstrations of terraces might be arranged by the Authority, using these methods. Actually, they can be constructed with a farmer's own equipment, such as tractors and ploughs or disc tillers. Once a few farmers in a district have learned the technique of making them, and any good ploughman can do so, all that is necessary is a little technical assistance in laying them out with a level and some consideration of the amount of water they may be expected to carry.

Once established, terraces must be checked for faults or failures and must be properly maintained. Pronounced low spots should be filled in and the flow of water kept uniform. Cultivation is on the contour. Any sediment that collects in the trough is turned upwards to the rim by ploughing.

Before terraces are constructed, a safe outlet must be provided. In many cases this will be a permanently grassed waterway. Meadowland or woodlots which resist erosion can be useful discharge places for surplus water.

6. Grassed Waterways

A grassed waterway may be a natural intermittent watercourse which is left in sod or seeded to grass, or may be specially graded to receive overflow and seeded to grass.

The simplest grassed waterway is established by tripping implements as they cross the sod on a watercourse when the hay or pasture in a field is being disced or ploughed under.

A grassed waterway may be established by grading or filling in a gully. If this is done, care must be taken to prepare a good seed bed by thorough cultivation, fertilization and packing.

The grasses used should be those which form a thick mat and will lie flat under running water. Kentucky blue grass is successful on rich soils. Timothy is adaptable to a wide range of soil conditions, but is a bunch grass and must be used with other grasses such as red top. Brome grass with its deep roots is suitable for deep, fertile soils. Reed canary grass will grow in poorly drained soils as in a deep, well defined waterway, but should not be used on well drained soils because its dense growth collects soil and dams up the water.

It is important in establishing grass waterways to get a good dense sod as soon as possible. If this cannot be done, a cover crop, sudan grass, oats or rye, may be seeded to give protection until a more permanent turf is established. In some cases it may be necessary to protect the soil with a mulch of straw manure, straw or wood chips.

Grassed waterways stop erosion, make better use of water and ensure delivery of clear water into the streams. A further advantage is that they may produce a good stand of hay year after year. For this purpose, it is wise to have gentle slopes which can be worked, and a width sufficient to allow a mower to go down and up the waterway.

7. Gully Control

Gully control may be achieved by vegetative or mechanical methods or a combination of both. They hinder cultivation of the land, allow water to run off rapidly, and their formation often is the cause of silting of good fields lower down.

There are three ways in which a gully may be controlled:

First, by a series of check dams. These make the water walk instead of run. Gullies serious enough for this treatment are not common on the Grand.

The second method is by diverting the water to some other channel by means of a dike, terrace or ditch. By this method water is diverted from the head of the gully before it reaches it, and is carried off on a gentle gradient for safe delivery elsewhere. When so treated a gully may be filled and cultivation allowed across it. This method may be worked into the farm plan, along with contour cultivation, terraces and grassed waterways.

The third method is to conduct the water safely down a channel and spread it out so that it does not attain erosive velocities. In small gullies, the sides may be ploughed in and the channel shaped and treated as a grassed waterway. For small gullies, this is the most effective and least expensive of the three methods. More serious gullies may call for a combination of all three.

Gullies cannot be controlled by filling them with garbage, old machinery and other trash. These create an eyesore on the farm and the erosion still continues underneath the pile of debris.

8. Drainage

Artificial drainage is the removal of the surplus water on the surface or within the soil to root depth and its redistribution to a channel where it does not interfere with top growth. This is the most widely practised conservation measure at the present time. It has two advantages; it makes soils of high inherent fertility capable of carrying the full range of crops that are carried on the well drained soils of the region. It has a further advantage of creating storage

capacity for moisture within the soil. A water-logged soil cannot store excess precipitation either of a heavy rain or of the spring thaw. Open drains are effective for the removal of surface water and as outlets for tile. Any problems connected with drainage are largely those of ditch maintenance. A ditch built with gentle slopes and well spread spoil banks may be a little more expensive to build, but the cost of maintenance is much lower and it remains effective for a longer time. Gentle banks with slopes as low as one in three do not slump in or erode as badly as steep slopes. Vegetation which may plug a ditch can be controlled in a gentle slope by using a mower. The bank and spoil, if they are smoothed out, can be made useful for hay, rather than wasted land if they are left rough.

Under-drainage by tile, as was noted above, is beneficial in two ways; tile at depths of two to four feet creates storage capacity for water in the soil and allows the penetration of roots to those depths into the warm, open soil. Some tile systems may be inadequate, but rather than add tile more closely spaced, much can be done to improve the natural drainage of the soil by using deep-rooted crops which improve the structure of the soil and allow the water to move through it.

Strangely enough, poorly drained soils can become seriously subject to drought. Crops in the early wet part of the season cannot root deeply. In the hot, dry season, moisture does not move readily upwards in the characteristically massive, poorly drained soils and the shallow-rooted crops suffer from drought.

The faults found in a tile drainage system are usually associated with inadequate or poorly constructed outlets. To provide good outlets, the last few feet of drain should be of vitrified tile or corrugated metal pipe extended a few feet out into the ditch or stream. A head wall will

prevent cutting back and an apron will prevent scouring and erosion of a gully by the water issuing from the outlet. Surface water should not be allowed to concentrate and discharge over the tile as this will cause a gully. A simple hinged gate permeable to water should hang over the outlet to exclude animals which may otherwise climb up the tile and plug it.

There is some land on the watershed which is poorly drained and on which it would not be economical or possible, for one reason or another, to establish drainage. The best use of this land can be made by establishing hay and pasture mixtures of species tolerant of wet conditions. Reed canary grass is one such grass. Thus, poorly drained areas now covered only by willow scrub and sedges, which may offer a refuge for cattle during the drought season but which produce very little, may be made to yield a good production. Grasses tolerant of very wet conditions, which can compete successfully with sedges, are usually quite succulent but tend to grow rank, coarse and unpalatable. To keep them in good condition for use later in the season, they need to be clipped to keep the growth firm, succulent and palatable for the cattle when they need this grazing. Thus, these lands can be used to good advantage to relieve the pastures on the better drained lands of overgrazing during the dry season and better use is being made of the moisture which is stored in these wet locations.

9. Woodland Management

Existing woodlots can be made to produce more and better wood and at the same time protect the soil and conserve water if they are brought under proper management. Two measures are vital. The first is to exclude cattle and thus protect the young growth. Where the woodlot is adjacent to pasture, a small group of trees may be left outside the fence for shade and comfort.

The second measure is to remove overmature, diseased and misshapen trees and undesirable species. Much

of this can be used for firewood. Or, if not needed for this purpose, the brush and polewood can be processed into wood chips. This is done by a portable wood chipper which converts such material into bedding for cattle, hogs or poultry at about half the cost of bedding obtained commercially.

Wood chips as bedding have a number of advantages. They are cheap and plentiful. They take up more moisture than straw and absorb ammonia. The ammonia and liquid manure saved in this way are just the ingredients necessary to decompose the wood so that it can be used on the land. The waste bedding also provides extra organic matter which the soil, in many cases, needs so badly.

It is recommended that the Authority purchase a wood chipper for loan to farmers as required, much in the same way as a tree-planter is loaned at the present time.

10. Farm Ponds

Small swampy or springy areas on farms which constitute water-storage areas should be protected and shaded by trees. To make use of the water for stock watering, ponds, properly constructed, will give ample use of water and preserve natural storage. Indeed, some old springs which are now merely areas of seepage might be restored by tree-planting and protecting the moist area from cattle or soil wash from eroded slopes.

Farm ponds are a useful conservation practice. The water stored in a farm pond will provide water for live-stock, fire protection, orchard spraying, garden or field irrigation, fish production, recreation and a breeding place for wildlife.

Farm ponds should be properly planned and constructed if they are to fill their intended purpose and certain basic principles of design and construction must be followed. A descriptive bulletin on farm ponds is available from the

Grand Valley Conservation Authority and assistance in laying out the pond and helping with the construction will be given by the Authority.

11. Windbreaks

Both slopes and valleys are exposed to sweeping winds and gusts. The lack of tree protection causes drifting of snow in winter and the drying out of soil in the fields in summer. Windbreaks may be established around every farm and around all groups of farm buildings. These make the distribution of snow much more even over the fields and reduce the loss of moisture by evaporation. Windbreaks properly placed around the farm buildings will protect lanes from snow drifts and add to the comfort of humans and animals alike as well as reduce the loss of heat from the home with a substantial reduction in heating costs.

CHAPTER 5

SUMMARY OF CONDITIONS ON HORNER CREEK

1. Regions

On the basis of soil type and land use there are three fairly distinct regions, a northern, middle and southern. The northern region is north of the tenth line of Blandford and Blenheim. The middle region is south of the tenth line and north of the sixth line of Blenheim. The southerly region is a narrow strip between No. 2 Highway and the sixth line of Blenheim. These boundaries are set as straight lines merely for convenience and do not follow natural boundaries. When the land is considered by regions, significant information becomes more obvious.

2. The Northern Region

This area comprises 22,332 acres. The soils are mostly of the heavy-textured types and inadequate drainage is the chief problem and erosion on the slopes the next most important; 44.5 per cent is classed II D and 36.8 is II R. Only 4.2 per cent is Class II C, that is, subject to erosion which can be easily controlled by contour cultivation. Provision of adequate drainage where needed and the use of crop rotations which will control erosion are the main conservation measures required.

With such emphasis on drainage some thought should be given to the effectiveness and condition of drainage outlets. About 40 miles of ditches and channelized stream were examined; 224,600 feet in all. Most of this is in the northern region. Of this only 16,000 feet appeared to be fully effective; twice as much, 33,900 feet, ineffective; and the greatest part, 174,700 feet, moderately effective.

Of the total length of drains 18,300 feet were well made and managed, 70,800 poorly made and the bulk,

A poorly constructed and poorly managed ditch can cause bank erosion, siltation and seasonal flooding.



When cattle trample the banks of a stream the water becomes muddy, the bed silted and the value of the stream for all purposes is reduced.



This well-managed pond is protected by a fence and as the trees grow and shade it it will lose less by evaporation. Water is drawn from this pond for over 50 head of cattle during the grazing season.

135,500 feet, were fairly well made. The following table summarizes the findings:

	<u>Feet</u>		<u>Feet</u>	<u>Per cent</u>
Effective	16,000	Well made	8,900	55.6
		Medium	5,200	32.5
		Poor	1,900	11.9
Moderately Effective	174,000	Well made	6,400	3.7
		Medium	114,400	65.3
		Poor	53,900	31.0
Ineffective	33,900	Well made	3,000	8.8
		Medium	15,900	46.9
		Poor	15,000	44.3
Well Made	18,300	Effective	8,900	48.6
		Mod. Effective	6,400	35.0
		Ineffective		16.4
Fair	135,500	Effective		3.8
		Mod. Effective		84.4
		Ineffective		11.8
Poor	70,800	Effective		2.7
		Mod. Effective		76.0
		Ineffective		21.3

3. The Middle Region

This area comprises 18,040 acres. The soils are of the medium-textured types and the country is hillier. Drainage is not the major problem here. Only 13.7 per cent of the land suffers from inadequate drainage. Erosion control, by vegetative means is required on 43.5 per cent in Classes II and III; 26 per cent is wooded, nearly 4 times as much as on



Rough hills of the kame moraine in the background have sandy and gravelly soils usually covered with sod or trees.



The gently undulating form of the till plain with its medium- and fine-textured soils make it well suited for agriculture.



The light soil of the sand plains was originally covered with oak-pine forest. Some of the land is well suited to tobacco in rotation with rye.

the northern region. This is due to the flat-floored valleys and the steep slopes. Soil-building crop rotations, permanent improved pasture, woodlot management and reforestation are the main conservation practices required here.

4. The Southern Region

This area comprises only 4,238 acres and is covered more by light-textured soils. The light-textured sandy soils are not of as high capability because of rapid loss of organic content and leaching out of fertility. Class II R land amounts to 30.4 per cent of the area. Inadequate drainage is the limiting factor on 48.5 per cent of the area. In such light-textured soils this is more easily corrected, and the well established natural drainage channels provide much better outlets than the channelized watercourses near the northern headwaters.

5. Comparison of Land Use in the Three Regions

The slight difference in climate from north to south is accentuated by difference in soil texture and drainage. In the northern region spring grain covers 33.0 per cent of the area and winter grain 10.1 per cent, totalling 43.1 per cent. In the middle region only 21.3 per cent of the land is in grain and there is nearly twice as much winter grain as spring grain. In one way this is a good adjustment of use to capability and needs, for the winter grains give protection to erodible soils by keeping them covered in the most critical seasons.

Intertilled, or hoe, crops are not so important in the north region where they, mostly as corn, cover only 1.9 per cent. In the middle region 14.0 per cent is covered by hoe crops, including large acreages of rutabagas and some tobacco. In the southern region hoe crops, mainly tobacco, cover 8.8 per cent of the land. Fortunately, where hoe crops

are grown, they are concentrated largely on the land of highest capability. The small acreages found on hilly and erodible land can be accounted for by the rectangular shapes of the fields.

Hay is grown on a much larger proportion of the northern region, partly because of the greater emphasis on livestock and partly because of less land in forest. In so far as grain and hoe crops exceed hay, however, the proportion of sod crops in the average rotation is less than half the period.

NORTHERN REGION

(North of tenth line of Blandford and Blenheim)

Present Land Use	Acres	Per Cent
Forest	1,534	6.9
Spring grain	7,367	33.0
Winter grain	2,246	10.1
Hay	6,180	27.7
Farm buildings	658	2.9
Orchard	61	-
Pasture	2,404	10.8
Hoe crops	434	1.9
Fallow	1,311	5.9
Urban	20	-
Idle	117	0.5
Total	22,332	100.0
Recommended Land Use Classes	Acres	Per Cent
F	1,537	6.9
I	60	0.1
II C	941	4.2
II R	8,156	36.8
II D	9,931	44.5
III C	15	-
III R	479	2.1
III D	201	0.9
IV P	153	0.7
IV T	45	0.2
V	781	3.5
VI	36	0.1
Total	22,332	100.0

MIDDLE REGION

Present Land Use	Acres	Per Cent
Forest	4,702	26.0
Spring grain	1,329	7.3
Winter grain	2,534	14.0
Hay	1,750	9.7
Pasture	3,210	17.8
Farm buildings	289	1.6
Orchard	11	-
Hoe crops	2,512	14.0
Fallow	299	1.7
Urban	28	-
Idle	1,355	7.5
Water	21	7.5
Total	18,040	100.0
Recommended Land Use Classes	Acres	Per Cent
F	4,702	26.0
I	-	-
II C	19	0.1
II R	5,902	32.8
II D	1,746	9.6
III C	32	0.2
III R	1,933	10.7
III D	314	1.7
IV P	429	2.4
IV T	449	2.5
V	2,218	12.3
VI	271	1.5
VII	4	0.1
Total	18,040	100.0

SOUTHERN REGION

Present Land Use	Acres	Per Cent
Forest	448	10.6
Spring grain	895	21.2
Winter grain	344	8.1
Hay	1,185	28.0
Farm buildings	93	2.2
Orchard	10	0.3
Pasture	698	16.5
Hoe crops	374	8.8
Fallow	60	1.3
Urban	-	-
Idle	131	3.0
Total	4,238	100.0
Recommended Land Use Classes	Acres	Per Cent
F	448	10.6
II R	1,289	30.4
II D	2,006	47.5
III R	120	2.8
III D	44	1.0
IV P	49	1.1
V	268	6.3
VI	14	0.3
Total	4,238	100.0

CHAPTER 6

A PROPOSED PROGRAM

1. The Recommended Land Use Map

Accompanying this report is a map which shows all the land on the watershed divided into the various recommended land use classes, which are shown in colour. In black and white can be seen the distribution of idle land, woodland, permanent pasture and cultivated land in rotation, as they were in 1953.

Any adjustments in land use, or the introduction of any special methods of tillage or cropping, need not reduce the acreage devoted to field crops. Indeed, the application of conservation methods and principles would increase production and improve the soil and water conditions of the area.

The map shows some small areas of land of higher capability (I, II and III) which are now under tree cover. It should not be necessary to remove these stands to provide more cropland, but in future years as stands become mature they may be clear-cut, as other use of the land is found, in the same proportion as rough land, now clear, is covered by trees by planting or by natural regeneration.

The map sums up all the natural features of the land in terms of its best use from the conservation point of view. It can therefore be considered as a guide to future use of land, but not necessarily an unchangeable plan of how land must be used. The more closely use and management of land fits the map, the more nearly are the aims of soil and water conservation achieved.

2. Carrying Out the Valley Project

Conservation of soil and water helps both the farmer and the community. The community interest may extend beyond the watershed. It is reasonable then that the carrying out of the valley project will be done by both the farmer and the larger community.

Much of the work can be done by the farmer himself. Where guidance and instruction are necessary, they are available to the farmer from the Soils Department at the Agricultural College, and can be obtained on making application to the County Agricultural Representative. Similarly, help in planning woodland management and in planting trees can be obtained from the Zone Forester. These services, provided by the Province, are examples of the interest of the community at large in making better use of land and water.

In the construction of farm ponds the Department of Agriculture assists by selecting sites and surveying and planning ponds. The Conservation Authority assists in financing those projects of which it approves.

Some conservation measures such as tree planting, woodlot improvement and stream channel improvement require more hand labour or special equipment than is available on most farms. Help may be obtained from such groups as Hunters and Anglers clubs, forestry groups, service clubs or boys' organizations. Special equipment such as tree-planters or grading machinery for gully control or constructing grassed waterways might be made available by the Conservation Authority.

Farm organizations exist which can do a great deal to advance a conservation program. For discussion and instruction the Farm Forums are ideally suited to conservation work. Local Soil and Crop Improvement Associations can do a great deal to implement ideas of better sod crops for soil building and better use of grass. Such a program should include the fertilizer and seed dealers and the implement dealers. Ploughing associations can help in learning and teaching tillage methods of special application to erosion control. Junior Farmers can effectively use competition, as they now do in cattle judging, to create interest in, and develop knowledge of, soil conditions.

In so far as a conservation project in a little valley is the concern of the Grand Valley Conservation Authority which represents all the people on the watershed, the Authority can give effective leadership and perform a useful service in arranging co-operation between existing groups as well as provide the outside help mentioned above. The Authority already has a hand in this through one of its Advisory Boards. A local board could be set up to carry out this one project, chaired by the member of the Authority as other boards are.

The Authority could also help by detailing a man to follow the project through, particularly in its initial stages. The introduction of a few individual remedies would make a good start. Heal any severe gullies, get a few more waterways grassed, plant some trees or get a woodlot cleaned out and fenced. A few more demonstrations of contour tillage and strip-cropping, such as already can be found on the watershed, might be arranged. Improved pastures, particularly on land which needs them critically, for erosion control, would be a big step forward.

3. The Measure of Success

The results of a concerted conservation program would be apparent in a few years in greater sustained yields and level of production on individual farms and in the valley as a whole.

The value of conservation to the stream and the water supply can be measured quite precisely. A gauge on the stream should show, over the years, an improvement in the flow of the stream. Ground water levels can be recorded by co-operation of local observers with the Provincial Geologist.

The greatest measure of success would be the enthusiasm, the confidence and the assurance of the people who took part in the program of soil and water conservation in a little valley.

4. Regional Emphasis

From the previous chapter it is seen that the emphasis is on different phases in the three regions. In the northern region the greatest emphasis should be on rehabilitating drainage channels. In the middle region emphasis should be on crop rotations, excluding hoe crops from land unsuited to them and on pasture improvement. In the southern region careful management of the level, light-textured soils is the key to the problem.

RECREATION

CHAPTER 1

RECREATION PLANNING

There is an urgent and ever-increasing need for public recreation facilities in the Grand Watershed. The location, extent and design of existing developments cannot satisfy the requirements of the population. The Grand Valley Conservation Authority can perform a valuable service to the people of the area by providing additional facilities designed to meet current needs.

The population of the Grand Valley has grown rapidly in the past decade and there are many indications that this trend will continue. In 1951 approximately 56.5 per cent of the watershed population could be classed as urban and it is almost certain that future trends will increase this percentage. Shorter working hours, paid vacations and increased wages have provided the people with more leisure time and the financial means to enjoy a wide variety of recreation.

A new attitude, which is in many ways a manifestation of the humanistic trends of this age, is developing towards the position and importance of recreation in the life of the individual, and the provision of the necessary facilities is now recognized as a sound social investment in the human resources of an area. The ever-increasing tempo of life is placing a severe strain on the health of the individual so that periods of rest, diversion and retreat have become essential. The manner in which the people utilize their leisure hours profoundly influences the development of personal character, physical health and mental stability. Recreation conditions the mind and body for the more satisfactory attainment of the basic necessities of life.

Recreation has economic as well as social implications. It provides work and offers possibilities for investment. It attracts capital from areas beyond the watershed and assists in the circulation of money within the area.

Cottage and commercial recreation developments contribute a significant proportion of the tax base of some municipalities.

A gradual but noticeable "rediscovery" of the recreation resources of the rivers and smaller lakes of Southern Ontario is in progress. The Grand Watershed is one area where the public is now becoming aware of the superb recreation potential which was largely by-passed in its enthusiasm for the shores of the Great Lakes and Northern Ontario.

Several factors combine to attract an increasing number of people to the rivers and lakes of the Grand Watershed. Many of the most desirable sites on the shoreline of the Great Lakes and in the Ontario northland have now been taken up for cottage development. People are often forced to accept inferior cottage sites which are far removed from the waterfront or else travel inconveniently long distances to obtain suitable locations.

The use of cottages and summer facilities in distant areas often necessitates the separation of various members of the family for long periods during the summer. These separations can give rise to considerable hardships and may have a serious impact on general family relationships. Difficulties can be avoided by obtaining cottage sites close to the main centres of population. A further advantage in selecting a summer cottage reasonably close to one's permanent residence is that it can be used for week-end trips including winter outings. This is impossible for many owners of cottages in Northern Ontario.

Fortunately for the people of the valley, some generous public-spirited citizens have been aware of the recreation needs of the area. Many parklands in the urban centres have been donated to the municipality at various times in the past and there is no doubt that other gifts will be made in the future.

In the past many privately owned lands have been used by the public for recreation purposes without raising serious opposition from the owners. However, recent developments in the area, which are sometimes the result of the increased demand for recreation space, have seriously curtailed the use of private lands as a supplement to publicly owned areas.

Some farmers are fencing their property and heavily posting it with "no trespassing" signs in an effort to exclude the cavalcade of Sunday motorists who roam the countryside in search of places to picnic. Many farmers do not object to a few well-behaved and considerate people using their riverbank meadows. However, an invasion of twenty or thirty cars on a Sunday afternoon, coupled with the irresponsible vandalism and slovenly picnic habits of some people who indiscriminately destroy trees and fences or leave the area strewn with bottles, paper and garbage, have forced many to close off their property to all picnickers.

The increasing development of summer cottages and suburban homes is seriously depleting these privately owned areas which were formerly used for recreation purposes. These developments are naturally located in the more select areas and the new form of land use usually results in the strict enforcement of private property rights. It is no longer possible to have a dual use of the land which was often obtained when the area was in pasture and woodland or simply lying idle.

If developments continue at the current rate and no provision is made for public use of riverfront areas, the local residents of the rural townships will find that they are cut off from the water. The farm population will suffer as well as the urban residents who visit the area on week-ends.

Many urban municipalities will soon find themselves surrounded by a solid wall of securely fenced private

property. which prevents the population of the city or town from reaching the riverfront in the suburban areas and also shuts out the residents of the suburbs who own homes behind the riverfront subdivision. The privately owned lands in valley areas on the outskirts of the urban centres have often formed an important recreation resource for the community. While they lay idle awaiting subdivision, or were put to a use which did not demand the rigid exclusion of the public, trespass was often permitted. These resources will be missed and in some areas the situation is already serious.

There is, therefore, a definite need for additional publicly owned recreation facilities in the Grand Valley to meet the changing social and economic conditions, and the Grand Valley Conservation Authority can make a valuable contribution towards this development. This contribution rests mainly in the field of regional recreation planning and development for the benefit of the people of the entire valley.

A wide variety of recreation facilities is required to meet all the needs of the population of the watershed. While the provision of some of these facilities is obviously the responsibility of the local municipalities, others must be developed by the Grand Valley Conservation Authority.

Conservation Authorities are in a position to give leadership in the field of recreation planning and in carrying out a positive program in this regard. The Grand and Thames Authorities have already done this and have established important park areas. Their position has been materially strengthened in the last few months by the passing of The Conservation Authorities Amendment Act, 1954, which makes it possible for Authorities to purchase land for recreation purposes.

In conclusion, it should also be noted that recreation developments offer the Conservation Authority a

valuable medium of publicity. For many people the recreation developments proposed in this report will be the first personal contact that they have had with the work of the Conservation Authority. It should make them more conscious of the value of their Authority in their lives and render them more appreciative of other aspects of conservation work.

CHAPTER 2

TOPOGRAPHY, CLIMATE AND TREE COVER

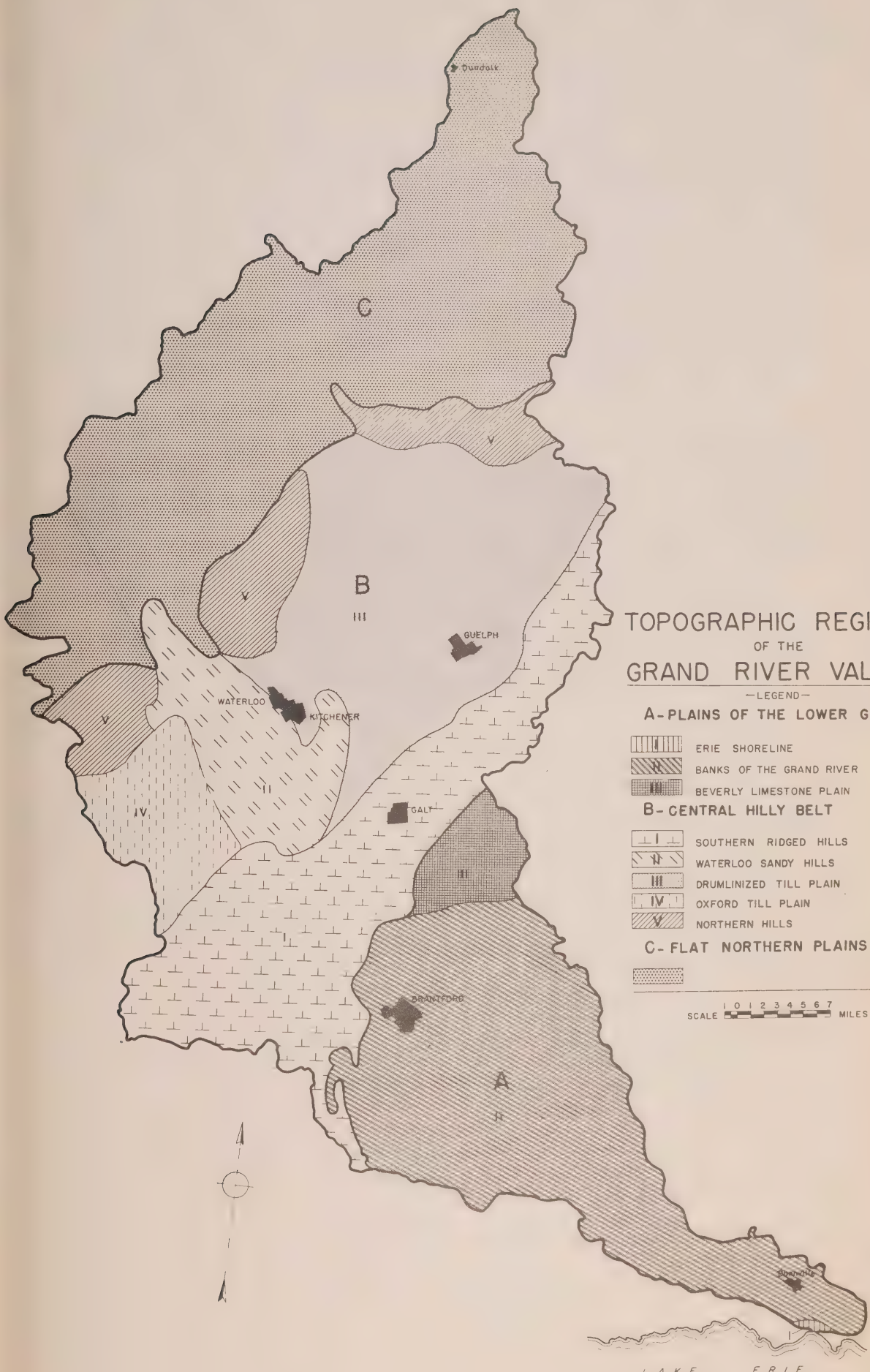
1. Topography

A glance at the map of Southern Ontario reveals the extent of the Grand Watershed and gives some suggestion of the magnitude of this study. The total area of the watershed is 2,613.9 square miles, or 1,672,899 acres. The valley, which comprises 4.9 per cent of the total area of Southern Ontario, is approximately 120 miles from north to south and has an average width of 22 miles. This area contains a wide variety of landscape types of noticeably different recreation value. However, it may be divided for the purpose of recreation studies into three broad topographic regions. These regions are designated A, B and C on the maps and are listed in a following table.

(A) Plains of the Lower Grand

The Plains of the Lower Grand extend northward from the shoreline of Lake Erie to the southern edge of the hilly morainic belt just north of Brantford. This region comprises nearly 360,000 acres, or about one-fifth of the area of the watershed. In general, the area is a relatively level sand and clay plain covering the former bottom of old glacial Lake Warren. In a few places immediately to the east and west of Hagersville, the level bedded limestone and sandstone bed-rock appear at the surface. In Beverley Township in the north-east section of the region the limestone rock is also exposed at the surface over a fairly extensive area.

The plain rises gently from an elevation of 573 feet at the mouth of the Grand River to approximately 700 to 725 feet in the area immediately north of Brantford. This is a rise of approximately 150 feet in 40 miles, or an average of 3.75 feet per mile.



TOPOGRAPHIC REGIONS
OF THE
GRAND RIVER VALLEY

—LEGEND—

A-PLAINS OF THE LOWER GRAND

- ERIE SHORELINE
- BANKS OF THE GRAND RIVER
- BEVERLY LIMESTONE PLAIN

B-CENTRAL HILLY BELT

- SOUTHERN RIDGED HILLS
- WATERLOO SANDY HILLS
- DRUMLINIZED TILL PLAIN
- OXFORD TILL PLAIN
- NORTHERN HILLS

C- FLAT NORTHERN PLAINS



SCALE 1 0 1 2 3 4 5 6 7 MILES

The monotonous expanse of level land renders much of this region unsuitable for recreation development. However, there are two notable and important exceptions, namely the Erie Shoreline and the Banks of the Grand.

(1) Erie Shoreline

This section, which lies in close proximity to the mouth of the Grand River, possesses some of the most desirable recreation land in the watershed. The clear and warm water of the lake, together with the excellent broad and sandy beaches, are strong attractions for both cottagers and week-end picnickers.

However, the fluctuating level of Lake Erie is a natural handicap which must be given due consideration in the location of permanent buildings. Wherever possible, cottages should be located atop or behind the sand dunes, which lie between the open beach and the flat clay plains to the north. This will give a degree of protection from ice damage and high lake levels.

In certain sections at the western extremity of Dunn Township and at the eastern end of Connor Bay in Sherbrooke Township, the shoreline is composed of readily erodible glacial till and lacustrine clay. Here the loss of shoreline and the damage to cottage property has reached serious proportions.

About a mile west of the mouth of the river, the limestone bedrock comes to the surface, to form the beach and shoreline. This section of the waterfront has not yet been intensively developed for cottage sites due, in part, to the proximity of the road to the shoreline. The difficulty of safely launching and landing small craft along the rocky lake-front is an additional handicap to the area - especially in rough weather. As the bed of the lake descends in a series of abrupt levels or ledges, the swimming is dangerous for the novice. However, the flat slab-like nature of the limestone

coupled with its high degree of resistance to erosion are decided advantages in an area of rapidly receding shoreline. A similar limestone outcropping to the east of the mouth of the Grand River occurs at Rockhouse Point*, which has now been secured by Sherbrooke Township for development as a public park.

The material composition of the beach varies considerably from year to year. Little can be economically undertaken to prevent the periodic development of stony and gravelly bars across the beautiful sandy beaches.

The open and exposed nature of the shoreline makes it difficult for cottagers to construct dock facilities for pleasure boats. However, the area is suitable for canoes and small outboard motor boats, which can be readily run up onto the beach. Within the shelter of Port Maitland Harbour there is satisfactory anchorage for larger craft of almost any size.

The value of the Erie waterfront was soon recognized and cottage development has continued apace since the turn of the century. The majority of the lakefront sites at the mouth of the Grand River have been taken up. Developments will undoubtedly occur very shortly along the limestone shoreline.

(2) Banks of the Grand River

The Banks of the Grand constitute the second subdivision of this region. The area is very attractive for cottage and picnic sites, as well as for boating, fishing and hiking.

In its lower reaches, the Grand is a broad, tranquil and majestic river. If the pollution of the water were overcome, it could be one of the most valuable recreation resources in Southern Ontario.

* This promontory is commonly called Barbet Point and comprises the major part of old Naval Reserve No. 24.

In its lower course, the river winds its way through a level flood plain only a few feet below the flat fields stretching on either side. Upstream, from a few miles below Cayuga, the Grand and its tributaries are entrenched well below the level of the adjacent plain and the river is bordered by steep-cut banks and dissected valley shoulders, which form a ribbon of attractive rolling to hilly topography. In the vicinity of Newport the valley shoulder is approximately 75 feet above the level of the river. To the north and east of Brantford, Fairchild Creek has similarly entrenched itself into the northern extremity of the level plains, south of Harrisburg and St. George,

These valley courses make excellent hiking and picnic lands and they will undoubtedly be utilized as cottage sites as the pressure for space increases. Their natural scenic beauty is a powerful attraction and any future improvement in the polluted condition of the river will enhance their value immeasurably.

However, there are certain characteristics of the Grand River and its major tributaries which must be given ample consideration in the development of recreation facilities. The Grand River is subject to great seasonal fluctuations in level. While many of these variations in water level could be reduced by the proposed flood control schemes, a certain degree of flooding will undoubtedly occur in the peak season.

Below Dunnville, cottage subdivisions along the Grand must be given very close scrutiny. Local municipalities should inaugurate satisfactory building requirements and zoning controls to curb development on unsuitable sites.

The smaller tributary streams to the main river, with the exception of Fairchild Creek, are unsuitable for recreation development. The surrounding topography is level and uninteresting and the streams are generally shallow, muddy and often completely dry for a large part of the summer season. For these reasons several of the larger streams which flow through the Indian Reserve are particularly unattractive.

Below Cayuga there are no tributary streams of any consequence and hence future developments will be restricted to the banks of the main Grand.

(3) Beverley Limestone Plain

This plain covers approximately 2 per cent of the area of the watershed, or about 35,000 acres. In its present condition, the level and drab limestone plain and associated swamplands are unattractive for recreation uses.

B) Central Hilly Belt

The second major topographic region on the watershed, and undoubtedly the one possessing the most versatile potential, is the area designated as the Central Hilly Belt. This medial belt is the largest of the topographic regions and embraces about 815,000 acres, or approximately 48 per cent of the Grand Watershed. Here a series of linear morainic ridges and associated broad valleys cuts across the watershed in a north-east to south-west direction. The well marked drumlin field in the vicinity of Guelph and the tumbled sandy hills of the Kitchener-Waterloo area have been included in this region.

There is a general regional rise in elevation, from approximately 800 feet on the southern morainic ridges to 1,275 feet in the sandy hills about Paradise Lake, and 1,550 feet on the sandy and silty hills north and east of Orton. While there is a general rise in elevation from south to north, there is also a great variation in local relief which presents a pleasing and welcome change from the level monotony of the southern plains.

This region is divided into five sub-regions which are of significance in recreation planning.

(1) Southern Ridged Hills

Across the southern section of this area there is a chain of linear morainic ridges which form part of a larger system of similarly composed hills known technically as the Horseshoe Moraines of South-Western Ontario. This is shown

as sub-region (1) on the accompanying map. The Grand River and its tributaries have carved many steep-sided and scenic valleys through parts of these hills with the result that some exceptionally good recreation areas are to be found here. One of the proposed Authority parkland developments is situated on the northern edge of these hills, in the vicinity of Rockwood. Another is located in Spottiswood Lake just south of Galt.

Many sections of these hilly ridges are extremely bouldery and hummocky and the steeper slopes are often seriously gullied and eroded. Much of the area should be retired from agriculture and reforested. In some cases recreation, such as skiing and picnicking, might be combined with the reforestation program.

(2) Waterloo Sandy Hills

A second area of importance is associated with the broad expanse of tumbled, sandy hills in the vicinity of Waterloo. Occasional clear and warm lakes, such as Paradise, Sunfish, and Hofstetter Lakes, are located in depressions in the Waterloo Sand Hills. Their recreation value is considerable due to their proximity to Kitchener and Waterloo.

Unfortunately most of the streams of the central section of these sand hills are shallow and intermittent due to the porous nature of the soil. Hence their recreation value is low. However, the main Grand River skirts the eastern edge of this area and produces some remarkable scenery in the reaches between Doon and Breslau.

The Nith River has broken through these sandy hills between New Hamburg and New Prussia, but due to the wide nature of the flood plain in this area, the spectacular vertical aspect of the scenery is lacking. Nevertheless, the river and its adjacent banks are of considerable value for picnics and cottage development. Much of the area is in need of reforestation and large tracts of land may become public property in the foreseeable future. While few of these sites possess

water resources, many could be developed to advantage as look-out points, picnic table locations, hiking trails and ski runs.

Many of the most highly desirable areas of this sub-region, such as the margins of Paradise and Sunfish Lakes, are already highly developed as cottage sites and there is little possibility of obtaining public recreation space here.

(3) Drumlinized Till Plain

The third sub-region, lying to the east of the main Grand River and extending north-eastward to the watershed boundary, embraces a well watered, drumlinized till plain. The area is characterized by oval or whaleback hills interlaced with many broad and sinuous valleys. The bulk of the upland area is high quality agricultural land, but the adjacent low-lying valley floors are threaded with many beautiful streams of good recreation value. The parkland at the Elora Gorge, which is now being developed by the Grand Authority, is located in this topographic region.

The variable rolling and hilly topography is pleasing to the eye and access by car is relatively easy. From the edge of many of the more precipitous valley sides and higher drumlin crests there are many attractive views across well appointed farmlands and wooded hills and valleys.

The broad valleys, interlaced with clear brooks and streams, provide splendid hiking and picnic areas. There is excellent swimming in some of the deeper holes of the streams and in the occasional quarries and ponds scattered throughout the region. However, in their headwater reaches many of the rivers are of very little value since the volume of water is small and the banks swampy and marshy.

(4) Oxford Till Plain

The flat Oxford Till Plain, at the western margin of the watershed, has been included as a fourth sub-region although its topography differs from the pattern of the

main region. In general this flat to gently rolling plain, which is traversed by small tributary streams to the Nith, is of little value from a recreation point of view. This is almost entirely agricultural country.

(5) Northern Hills

A northern rim of dispersed and frequently separated morainic hills forms the fifth sub-region. From a recreational point of view, there is nothing unique in this area. Certain sections, in particular the Hillsburgh Sand Hills containing the headwaters of the Speed and Eramosa Rivers, are in need of considerable reforestation. If such a program were carried out, some of the higher knolls from which an excellent view of the surrounding countryside can be obtained might be coupled with the development of recreation facilities.

(C) Flat Northern Plains

The third major topographic region of the Grand Watershed, which embraces about 30 per cent of the total area, or approximately 500,000 acres, has been called The Flat Northern Plains.

This level region forms a part of the larger Dundalk Plains. The land rises gently in regional elevation from approximately 1,550 feet in the south-west to 1,725 feet at the northern edge of the watershed. Large areas of poorly drained swamp and bog, of which the Luther Swamp is the outstanding example, are a common feature of the plain. The upper reaches of the Conestogo and Grand Rivers have entrenched themselves 50 to 75 feet below the plain.

The recreation value of the area is confined to the Grand Valley in the vicinity of Grand Valley-Waldmar and the valley of the Conestogo River from Wallenstein to Stirton. In the latter location, the dissection of the valley walls has produced a picturesque rolling landscape of exceptional scenic value which stands in marked contrast to the flat topography of the level plains stretching on either side.

TOPOGRAPHIC REGIONS OF THE GRAND WATERSHED

	Per Cent of Watershed Area	Acres
A. Plains of the Lower Grand	21.5	359,674
B. Central Hilly Belt	48.7	814,704
C. Flat Northern Plains	29.8	498,526
	100.0	1,672,904

2. Climate

Although there are no variations in climate of any great significance between different localities in the Grand Watershed, certain areas display a marked homogeneity and these may be distinguished, compared and contrasted with other areas on the watershed. These climatic regions possess a fair degree of conformity with the previously discussed topographic regions. For convenience the same map and nomenclature are used and the climate is discussed with reference to the three divisions.

Each of the four seasons of the year is associated with a set of recreation habits and patterns, which have become traditional with our people. This chapter is concerned with the suitability of the climate of the various regions of the watershed for the maximum enjoyment of these pastimes.

(a) Temperature

The variations in the mean annual temperatures, which range from 42°F. in the north of the watershed to 46°F. in the vicinity of Cayuga and the Erie Shoreline, are of little significance in recreation.

The variations in the winter temperatures, as indicated in the table below, are of considerable importance.

<u>Region</u>	<u>Mean Winter Temperatures</u> <u>Degrees Fahrenheit</u>			
	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>March</u>
A Plains of the Lower Grand	26-28	22-23	20-21	29-32
B Central Hilly Belt	22-26	19-22	15-20	24-30
C Flat Northern Plains	22	18-19	15-16	24-25

While the entire watershed shows average winter temperatures which are below freezing, there is a significant variation in the intensity of the frost in different areas of the valley. The average temperatures are well below freezing in the Flat Northern Plains during all four winter months and conditions for outdoor skating, sleighing and skiing are usually satisfactory. The Central Hilly Belt displays similar features, but towards the end of March the warmer daytime temperatures usually result in poor ice conditions. In the Plains of the Lower Grand satisfactory natural ice cannot be relied on during March and much of December will be unsuitable.

The incidence of thaw (above 32°) is an important factor with respect to ice formation. Daytime temperatures which rise above 32° can often be offset by extremely cold nights. However, sometimes the temperature remains above freezing for sufficiently long periods to destroy completely the ice beds on outdoor rinks, or to remove all snow from the hills.

Incidence of Thaw 1948

	<u>Number of Days with</u> <u>average of 32° F. or more</u>			
	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>March</u>
A. Plains of the Lower Grand ¹	22	6	11	20
B. Central Hilly Belt ² (North)	15	2	10	19
B. Central Hilly Belt ³ (South)	22	7	10	20
C. Flat Northern Plains ⁴	2	1	8	17

- 1 - Based on records for Caledonia and Canboro
- 2 - Based on records for Kitchener, Guelph, Shand Dam
- 3 - Based on records for Brantford and Galt
- 4 - Based on Mount Forest records

In the Flat Northern Plains thaw was infrequent during December, January and February. There were 17 days in March during which the average daily temperature was about 32°. However, these were in the latter part of the month and the average temperature for all of March was 32°.

In both the north and south of the Central Hilly Belt, temperatures about 32° were common in December and March. Winter sports conditions were definitely poor during March, as is usually the case.

In December and March, the plains of the Lower Grand had more days with an average temperature above freezing than below. After March 12 every daily average temperature was above 32° and the mean average for the month was 41°.

The Flat Northern Plains usually have 30 days more satisfactory ice conditions than the Plains of the Lower Grand. The Central Hilly Belt lies somewhere between these two but the month of March is unreliable. Some years the winters are too mild over the entire watershed.

There is only a slight variation in the average monthly summer temperature throughout the valley, as indicated in the accompanying table. The three summer months are quite satisfactory for all forms of outdoor summer recreation.

	<u>Average Monthly Temperature</u> <u>Degrees Fahrenheit</u>		
	<u>June</u>	<u>July</u>	<u>August</u>
. Plains of the Lower Grand	64-65	70	67-68
. Central Hilly Belt	62-65	66-70	64-67
. Flat Northern Plains	62	66	64

The slightly warmer temperatures of the Plains of the Lower Grand give an added attraction to the Erie Shoreline.

(b) Rainfall

The variations in the mean annual precipitation, from 37 inches in the north of the watershed to 34 inches in the south, are of no recreational significance.

The records for the summer months do not show an important difference between any sections of the watershed. The entire valley receives between 8 and 9 inches, which is the average for all south-western Ontario.

(c) Snowfall

The variations in the average winter snowfall are of considerable importance in recreation planning

	<u>Average Snowfall</u>
A. Plains of the Lower Grand	50" - 60"
B. Central Hilly Belt	60" - 70"
C. Flat Northern Plains	80" - 90"

The northern half of the watershed lies within the so-called snow belt of Southern Ontario. Due to low winter temperatures, the heavy falls in this area are usually held on the ground for long periods. Conditions here are among the best in Southern Ontario and winter games could be more extensively developed to capitalize on the advantages of the heavy snowfall.

(d) Sleet

Sleet storms can seriously affect general track conditions for skiing and sleighing and frequently result in food shortages for game birds. When compared with the general conditions in Southern Ontario, sleet storms are found to be relatively frequent on the Grand Watershed - especially in the south and west sections. During the winter season, these areas are usually affected, and the south-west part of Waterloo County in particular.

(e) Sunshine

From April to September, the southern section of the Grand Valley below Brantford receives considerably more sunshine than does the northern half. This largely contributes to the more buoyant atmosphere of the Erie Shoreline. The Flat Northern Plains obtain only 46 per cent of the possible bright sunshine from April to November, while the Plains of the Lower

Grand and the Erie Shoreline receive about 54 per cent during these months. The Central Hilly Belt lies between these extremes, large areas having just about 50 per cent of the possible maximum.

3. Tree Cover

The vegetative cover, both natural and artificial, has a marked influence on the recreation potentialities of the area. The intrinsic character and natural beauty of our Southern Ontario landscape is largely determined by the green mantle of trees and shrubs in which it is clothed.

There is a wide variety of trees in the woodlands of the Grand Watershed and they occur in a number of distinguishable combinations and associations, in relation to soil and climatic conditions. Generally speaking, there are two major forest regions on the watershed which merge gradually into each other, in a belt running roughly north-east to south-west across the watershed in the vicinity of Paris.

The southern section is associated with the Deciduous or Carolinian Forest Region of Southern Ontario. Climatic conditions here are more favourable for southern species than in the northern sections of the river basin. In most years the growing season is over 150 days.

The woodland cover of this region is mainly composed of broad-leaved deciduous trees. Coniferous species are less numerous, restricted to scattered hemlocks and occasional pockets of white pine. The predominant trees of the area are beech and sugar maple, intermingled with basswood, red maple and red, white and bur oak. In the Lower Grand the oaks are particularly prominent in some parts. Many southern species such as tulip, hickory, sassafras and black walnut reach their northerly limit in this region. They add to the botanical interest of the area and lend a distinctive character to the forest, which stands in noticeable contrast with the woodlands of the northern reaches of the Grand Watershed.

In the northern section the deciduous trees dominate the area, but there is a considerable reduction of species, as the less hardy southern types fade out. The coniferous species of the poorly drained riverbottoms, especially white cedar, are found in large quantities and their abundance contrasts sharply with their meagre representation in the southern region. The dominant species on the upland areas are sugar maple and beech. Basswood, white elm, yellow birch, white ash and some oak are commonly associated with these.

Apart from the distinctive character that these two regions lend to the landscape, they create no decisive difference in the recreation activities of the two areas.

In certain sections of the northern formation, the predominance of the softwood species along the river banks and poorly drained areas often produces miniature landscape patterns which in some ways approach conditions on the Canadian Shield. As a result, these areas offer considerable attraction for those who desire cottage sites with a close approximation to northern "wilderness" atmosphere.

The blaze of autumn colours in the woodlands of the Grand Watershed provides a magnificent spectacle. Thousands of urban dwellers are drawn into the open countryside for a final weekend motor trip before the approach of winter. Both areas are attractive at this season of the year, but perhaps the northern woodlands present the more spectacular scenery, due to the massed effect of the forest cover and the presence of the contrasting deep green hues of the coniferous species.

Bog and marsh conditions are often encountered in the shallow depressions of the elevated northern plains, and the famous Luther Swamp, with its distinctive vegetative patterns, is worthy of mention. The Grand River Conservation Commission has already acquired much of this swamp which now

forms the Luther Marsh Reservoir. Nevertheless, there is still a considerable area of moss, heath and shrubs around the margins of the artificial lake.

Trees are a valuable asset to the recreation resources of any area, from both the aesthetic and practical viewpoint. They lend beauty and character to the landscape, are a source of interest to the field naturalist, provide cover for game and shade and shelter for the picnicker.

CHAPTER 3

POPULATION, OCCUPATIONS AND TRANSPORTATION

1. Population

The growth, density and distribution of population on the Grand Watershed is of vital concern to the recreation planner. An analysis of these trends provides a valuable guide to the location, size and type of facilities required.

The estimated population of the Grand Watershed, based on the census returns of 1951, is 291,800, which is 6.3 per cent of the total population of Southern Ontario. These figures in themselves give some indication of the scope and magnitude of the recreation program that will be required to satisfy the needs of the residents of the valley. In addition, they are worth remembering when considering the possible benefits of any recreational development or the ability of the Authority to finance a particular program.

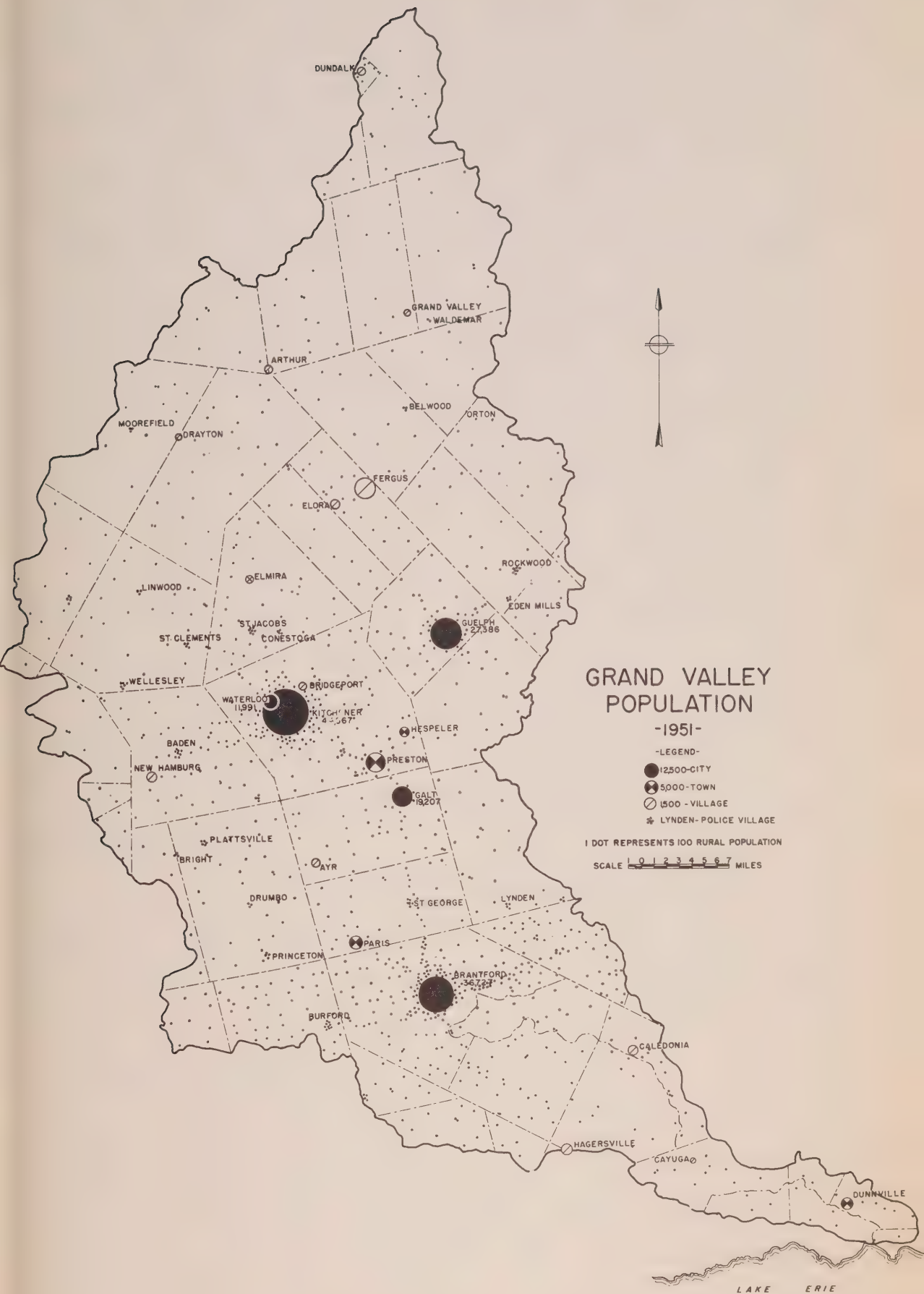
Over half the population (61* per cent†) can be classified as urban, since the people dwell in incorporated cities and towns which display many of the characteristics of larger metropolitan areas.

Between 1941 and 1951, the population of the watershed has shown a decennial increase of about 54,000 or 22.7* per cent†. This trend is likely to continue in the future, but perhaps at a less rapid rate.

It is difficult to determine accurately the future population of the valley. The economy of the area is still expanding and marked deviations from any projected trends could result from outside disturbances, such as the induced

* About 163,816 people can be classified as urban dwellers and 126,289 as rural.

† The percentage increase in the total population of Ontario between 1941 and 1951 was approximately 20.5.



provincial decentralization of industry, or the impact of the proposed St. Lawrence Seaway. However, it would be reasonable to expect another 60,000 people in the valley by 1971 and this would bring the total population to approximately 350,000*. A population of 400,000 would not be impossible by 1971.

The increase between 1941 and 1951 was not uniform throughout the watershed. The larger cities and their surrounding suburban fringes received greater increases than the rural areas. This differential becomes even greater when we remember that much of the suburban population surrounding Brantford is urban in character and cannot be truly classified as rural. If we subtract this population increase from the rural totals, it is found that at least 75 per cent of the growth has been urban.

From the accompanying table it should be noted that about 94 per cent† of the urban population increase has occurred in the Central Hilly Belt. It is from this group that the most urgent demand for recreation facilities in the Grand Valley will come. Their requirements are considerable at the moment, and they will increase proportionately with the future growth in population.

While most of the rural areas have shown a population increase during the period 1941 - 1951, some townships have actually experienced a decline. All such townships, with the exception of Dunn, are located on the northern plains at the upper extremity of the watershed.

The recreation demands of the rural townships with declining populations will not be as great as in other sections of the watershed. Many people in these areas use facilities on Lake Huron and Georgian Bay. As the population

* This assumes only a 10 per cent increase over the present population in each of the next two decades.

† In this calculation, Brantford has been included in the Central Hilly Belt.

further declines, certain properties may come into public ownership for reforestation programs. Unfortunately little of this land is scenically attractive and suitable for recreation uses.

The trends in rural population are given in the accompanying tables. The variations in the densities of the rural populations readily reveal the sparsely populated areas of the watershed. The northern townships of the Grand Valley stand out clearly as areas of low density, while the rural municipalities of the Central Hilly Belt possess much higher concentrations of population.

The influence of suburban development is reflected in the high densities of the townships surrounding the larger urban centres. This is especially noticeable where there has been no annexation of land by the urban municipality in the last few years.

2. Occupations

The occupational patterns of an area have a considerable bearing on the recreational necessities and demands of the population. Both the farmer and the factory workers receive benefits and pleasures from a satisfactorily organized recreation program. Both have an interest in the proposed developments. The factory and office workers of the larger urban centres have a positive need for outdoor facilities which will condition the mind and body for the rigours of daily living. For them it is a question of mental and physical health in addition to pleasure. While those who live on farms normally receive ample fresh air and sunshine in their daily work, they also can receive immense pleasure from well conducted rural parks with sports fields and swimming facilities.

The support of industrial owners in the watershed should be enlisted for the program. There are signs that the more progressive ones realize the value of recreation facilities

RURAL POPULATION IN THE WATERSHED

(A)

Municipality	Population		Per Cent Change		Area in Water-shed sq. mi.	Density per sq. mi. 1951
	1941	1951	Increase	Decrease		
BRANT COUNTY:						
Brantford	9,285	17,589	89.4*		108.5	163
Windsor	3,900	4,776	22.4		54.2	88
Windsor S.	2,619	3,112	18.8		72.3	43
Windsor	937	1,168	24.6		16.7	70
Windsor	992	1,168	17.7		32.1	36
Windsor	2,377	3,059	28.6		--	-
DUFFERIN COUNTY:						
Windsor	1,335	1,295		2.9	81.0	16
Windsor E.	835	875	4.7		52.7	17
Windsor E.	970	902		7.5	60.2	15
Windsor	1,562	1,406		9.9	65.2	22
FRANKLIN COUNTY:						
Windsor	452	417		9.4	3.8	11
HALDIMAND COUNTY:						
Windsor	220	242	10.0		6.7	36
Windsor N.	864	910	5.3		35.6	26
Windsor S.	294	315	7.1		12.3	26
Windsor	576	542		5.9	14.3	38
Windsor	1,063	1,128	6.1		44.8	25
Windsor	539	613	13.8		15.5	40
Windsor	1,280	1,404	9.6		25.4	55
Windsor	72	76	5.5		3.6	21
Windsor	415	450	6.0		--	-
HALTON COUNTY:						
Windsor	622	645	3.8		22.4	29
NORFOLK COUNTY:						
Windsor	950	1,070	12.6		29.3	36

Much of this increase is not truly rural and is due to the fact that the large suburban population surrounding Brantford has not been incorporated into the city. Similar conditions exist in some other areas of the watershed, as can be seen from the table.

RURAL POPULATION IN THE WATERSHED

(B)

Municipality	Population		Per Cent Change		Area in Water-shed sq. mi.	Density per sq. mi. 1951
	1941	1951	Increase	Decrease		
OXFORD COUNTY:						
Blandford	737	624		15.3	21.9	28
Blenheim	3,590	3,940	9.7		104.0	28
Oxford E.	636	776	22.0		20.8	37
Zorra E.	439	466	6.1		9.7	48
PERTH COUNTY:						
Easthope S.	258	273	5.8		9.7	28
Easthope N.	907	894		1.0	37.7	24
Mornington	1,614	1,602		.7	59.6	27
Wallace	50	47		4.6	1.6	29
WATERLOO COUNTY:						
Dumfries N.	2,996	4,178	39.4		66.3	63
Waterloo	9,247	13,682	47.9		117.6	116
Wellesley	4,236	4,679	10.4		101.6	46
Wilmot	4,215	4,865	15.4		95.7	51
Woolwich	4,061	4,778	17.6		84.7	56
WELLINGTON COUNTY:						
Arthur	923	814		11.8	31.9	25
Eramosa	2,287	2,479	8.4		68.1	36
Erin	1,302	1,311	.6		59.5	22
Garafraxa W.	1,382	1,422	2.8		74.6	19
Guelph	3,984	4,771	19.7		51.3	93
Luther W.	1,291	1,224		5.1	59.6	20
Maryborough	1,652	1,624		1.6	78.1	21
Nichol	1,471	1,606	9.1		41.9	38
Peel	2,713	2,751	1.4		116.4	24
Pilkington	1,035	1,121	8.3		45.7	24
Puslinch	1,540	1,959	27.2		68.1	29
WENTWORTH COUNTY:						
Ancaster	3,506	5,062	44.3			
Beverley	2,286	2,759	20.7		87.2	32

URBAN POPULATION ON THE GRAND WATERSHED

Municipality	Population		Per Cent Increase
	1941	1951	
Cities:			
Brantford	31,948	36,727	14.9
Galt	15,346	19,207	25.1
Guelph	23,273	27,386	17.6
Kitchener	35,657	44,867	25.8 *
Waterloo	9,025	11,991	32.7 *
Towns:			
Dunnville	4,028	4,478	11.1
Elmira	2,012	2,589	28.6
Hespeler	3,058	3,862	26.2
Paris	4,637	5,249	13.1
Preston	6,704	7,619	13.6
Villages:			
Arthur	937	1,088	16.1
Ayr	761	931	22.3
Bridgeport †	-	1,137	--
Caledonia	1,401	1,681	19.9
Cayuga	709	719	--
Drayton	504	541	7.3
Dundalk	688	768	11.6
Elora	1,247	1,348	7.9
Fergus	2,832	3,387	19.5
Grand Valley	622	628	--
Milverton	1,015	1,055	3.9
New Hamburg	1,402	1,738	23.9

* The very large increase in the population of Kitchener and Waterloo is due to annexation between the census dates.

† Bridgeport was not incorporated in 1941.

for the industrial workers, as evidenced by the Kaufman Park development on the Grand River about a mile north-east of Bridgeport. The trade unions could also give valuable assistance and advice in recreation planning.

The importance of the industrial developments in the economy of the Grand Watershed is immense. In 1950 this area produced approximately 8 per cent of the gross value of all industrial products in Ontario or just slightly over 550 million dollars. The bulk of this production (over 95 per cent) comes from the industrial cities and towns of the Central Hilly Belt.

There are approximately 60,000 industrial workers in the valley, which is about 10 per cent of all such employees in Ontario. Their total payroll, over \$130 million dollars in 1950, was about 6.4 per cent of the total for Ontario.

The significance of the foregoing facts and figures should be realized. The Authority is planning for a wealthy industrial area which looms large in the total industrial economy of the Province. Adequate plans for such a large number of people will be costly, but when the economic prosperity of this area is considered there is no reason why the Authority cannot find substantial sums of money for the purpose.

3. Transportation

Transportation is an important factor in the development of recreation facilities. In the early years the railroads offered the only practical means of reaching distant recreation areas and they were largely responsible for the initial development of a number of such centres in Southern Ontario. The advent of the automobile has reduced this business to a minimum in many areas. Today the role played by the railroads in the recreation activities of the Grand Valley is insignificant. However, the possible integration of the

rail facilities into the future recreation program proposed in this report is worthy of consideration.

Rail transport is highly inflexible and new lines can rarely be laid down to service playground areas. Special trips can only be scheduled on existing routes when the demand is heavy. In effect, services can be supplied only to large central recreation areas that lie adjacent to existing lines.

The Grand River Railway would appear to be in a favourable position to provide transport to park facilities. The line, which was primarily designed to carry passenger traffic but is now mainly devoted to freight haulage, joins up many of the large urban centres of the watershed. The route, which is undoubtedly one of the most scenic in Southern Ontario, passes through the heart of some of the finest recreation areas in the river basin and provides direct access to two of the large multi-purpose parklands which are planned for the area.

There are many people in the cities of the Grand Valley who do not own automobiles and they would likely make use of a public transport facility which would carry them quickly and cheaply to recreation areas. The greater opportunity for social contact and increased personal acquaintances which rail transport can offer, may even induce some automobile owners to leave their cars at home, if a convenient and reasonably priced alternative is available. Many would welcome the possibility of avoiding the strain of driving on crowded highways, where the risk of accident is so high.

Municipal and commercial bus services carry a considerable volume of passengers to recreation areas on the outskirts of cities and in the open countryside. Coaches are frequently chartered for institutional picnics to commercial parks. Bus transportation is more flexible than rail and there is little to prevent an expansion of summer schedules to established parklands in the valley. The distances involved would not be great and rates could be kept reasonably low.

Municipalities could expand and extend their public transport systems to carry their urban populations to recreation areas. Commercial companies may be induced to service some parks. When the Grand Valley Conservation Authority has fully developed the park at the Elora Gorge, special summer bus services between this recreation area and Kitchener, Guelph, Halt and Preston should be a paying proposition.

Today the majority of the people use automobiles to reach the various recreation areas in the valley. In 1951 the population of Brant and Waterloo Counties was nearly 99,000 and the total registration of passenger automobiles in these counties in 1952 was 46,929.* It would appear that there is about one registered passenger car for every 4.2 people in the area.

Automobile transport offers the greatest degree of personal choice of route, destination and time of arrival and departure. However, rail and bus transport, when working close to capacity load, are far more economical in terms of money and unit space required.

Figures are from the Third Annual Economic Survey of Ontario (1951).

CHAPTER 4

PUBLIC PARKS AND PUBLICLY OWNED LANDS

Municipal Parklands

There is a total of approximately 1,450 acres municipal parklands within the Grand Watershed. These lands are divided between the cities, towns, villages and townships in the proportions indicated in the following table.

Municipal Parklands*

Cities.....	819 acres
Towns	173 acres
Villages	158 acres
Police Villages	37 acres
Townships	263 acres
	<hr/>
	1,450 acres

The five cities of the Grand Watershed, namely Kitchener, Waterloo, Guelph, Galt and Brantford, have a combined park area of 819 acres. In actual fact the park area within their incorporated limits is only 757 acres because Rest Acres Park (27 acres) belonging to Brantford, and Homer Watson Park (35 acres) belonging to Kitchener, both lie in adjacent townships some distance outside the city limits.

The combined populations of these five cities is approximately 140,000. Accordingly there is an average of 5 acres of parkland of various types for every 1,000 people. The approximate acreage of parkland per 1,000 people is given in the following table.

Acres of Parkland per 1,000 People

Brantford	5.2
Galt	6.2
Guelph	5.1
Kitchener	6.0
Waterloo	5.9

This table is considered correct to within 5 per cent. In some cases it was necessary to estimate areas.

It is difficult to lay down standards for the minimum amount of parkland required per capita of the population. The National Playing Fields Association of Great Britain recommends a minimum of 6 acres of playing fields per 1,000 of the urban population. Sir Patrick Abercrombie's Plan for the County of London envisages 7 acres of open space for every 1,000 people - 4 acres to be located in London itself and 3 acres in the proposed Green Belt.

American authorities vary widely in their estimates of requirements. Many recreation planners state categorically that there should be at least 1 acre of city parks and playgrounds for every 100 people and an additional acre in the county and metropolitan parks surrounding the city. Town planners in the United States frequently talk in terms of 5 acres per 1,000 of the urban population.

Spence-Sales[†] stated that open space should not be less than 10 per cent of the area of the surrounding housing development.

PARKLANDS IN SELECTED CITIES OF U.S.A. (1941)**

City	Park Acreage per 1,000 People	Per Cent of Incorporated Area in Park
Chicago	12.20	1.3
New York	10.91	3.8
Cleveland	10.02	4.2
Boston	8.69	6.6
Cincinnati	8.56	2.1
Buffalo	6.25	0.8
Detroit	2.65	0.3

* A program to provide Recreation Areas in South Eastern Michigan. Michigan Dept. of Conservation, Lansing, Michigan. 1943 (2nd edition).

† Spence-Sales, H. How to Sub-Divide. Community Planning Association, Ottawa. 1950. p. 25.

** New York Regional Plan Bulletin, October, 1942.

Apart from any land-per-capita considerations it is evident that the parkland systems of the urban areas of the Grand do not satisfy all the recreation requirements of the population. Very few of these parks can supply outdoor picnic facilities in surroundings completely divorced from the urban environment in which they are set. It is partially for this reason that Kitchener and Brantford have secured areas beyond their urban limits for development as park and picnic areas which provide a more rural atmosphere.

The incorporated towns of the Grand Valley, five in number, have a total population of nearly 23,800 and a combined park area of 173 acres. In effect these towns have .1 acres of parkland for every 1,000 people.

However, conditions here are not quite as satisfactory as one might conclude from the figures. About 2 per cent of these town park areas are wholly undeveloped, and much of the remaining area is in small pieces which are of little use for recreation. The Town of Preston, which has a very large riverside park, tends to raise this average considerably.

If one excludes Preston from this group of five towns and discounts the undeveloped parkland in the remaining towns, the total area of effective parkland is reduced to 3.3 acres per 1,000 population. Hence in all these towns but Preston, where there are about 11 acres of parkland per 1,000 population, the park area is inadequate.

The incorporated villages of the Grand Valley, with a total population of 15,000, have a total park area of 158 acres or 10.5 acres per 1,000 population. However, 50 per cent of this land is fairground property which is rarely used for recreation purposes except for a few days each year at fair time. Even when one deducts the fairground areas, the villages are left in a more favourable position than the cities and towns. Their park situation is further improved when one considers the ease with which their residents can get to the

open countryside. The park position in the villages of the valley would be almost adequate if existing properties were satisfactorily developed in all cases, and perhaps in some instances if unsuitable sites were sold or exchanged for more scenic locations.

The total rural population in the Grand Valley is approximately 112,800 and the park area in the townships is 33 acres. The average area of parkland for all townships is approximately 2.3 acres per 1,000 people.

The position of the rural townships of the Grand Valley is far from enviable. A large number of rural municipalities have absolutely no parkland. Many of these municipalities include long stretches of the Grand and its major tributaries and contain some extraordinarily fine recreation lands which should be in public ownership.

Privately Sponsored Public Parks

Generally speaking, private individuals and organizations do not provide and maintain parks for the use of the general public in the open countryside of the Grand watershed. However, Kaufman Park on the west bank of the Grand River in Waterloo Township is a notable exception to the above. Here Mr. Kaufman has developed a small section of his property as a park and opened it to the general public free of charge. Picnic tables, fireplaces and water are available. The park is provided with electric lights for evening use. The area has been landscaped and there is ample shade and a good grass turf. To a limited extent, bathing is possible in the river.

This development is intensively used by the public during the summer season, and undoubtedly has been greatly enjoyed by many thousands throughout the past few years.

Reforestation Land and Recreation

As a rule reforestation land secured up to the present time is not suitable for recreation purposes. Land

covered with a dense planting of coniferous trees is not an attractive habitat for game, and even hiking is more pleasant in more varied surroundings, but quite apart from this consideration people seeking recreation are a menace in any area reforested with coniferous trees because of the danger of fire from camp-fires and cigarettes. For these reasons reforested areas should only be used for recreation purposes in exceptional circumstances and then should be heavily patrolled. Winter sports are the exception and where facilities such as ski runs, skating and bob-sleighbing are possible, these should be encouraged.

CHAPTER 5

COMMERCIAL PARKS AND BOAT RENTAL FACILITIES

The small commercial park has become an important feature in the recreation pattern of the Grand Watershed. There has been a rapid growth of these facilities in the past twenty-five years. They are likely to increase in number in the future and will probably become progressively more elaborate.

During the summers of 1952 and 1953, periodic checks were made at various parks in the watershed and most of the operators were personally interviewed in order to determine the nature and intensity of use of the facilities offered. In this way an attempt was made to assess the importance of these parks in the recreation activities of the people of the area. Unfortunately many of the owners were vague in their estimates of attendance. In some cases it was necessary to base calculations solely on occasional observations made during the summer. Few operators maintain accurate records of the volume of attendance and their estimates were often based on the number of cars* arriving at the park rather than on the people.

Attendance at Commercial Parks in the Grand Valley during 1952

11 Parks of the Plains of the Lower Grand	22,000 persons
11 Parks of the Central Hilly Belt	155,000 persons
	<hr/>
	177,000 persons

During the ten weeks of the summer season of 1952† at least 177,000 people patronized the commercial parks of the Grand Watershed. On many of the major holidays during the peak of the summer season, these parks perhaps had a total

For conversion purposes it was considered that each car would carry an average of 4 persons.

During the summer of 1953 these commercial parks drew a total attendance about equal to that of 1952.

COMMERCIAL PARKS

-LEGEND-

- COMMERCIAL PARKS 2
- A PLAINS OF THE LOWER GRAND
- B CENTRAL HILLY BELT
- C FLAT NORTHERN PLAINS

SCALE 1 0 1 3 5 7 MILES



attendance of 15,000.

About 88 per cent of the customers utilized facilities located in the Central Hilly Belt, and for the most part these people were residents of the valley. The parks of the Lower Grand drew only 12 per cent of the total but a high proportion, possibly 80 per cent, came from beyond the watershed.

The 22 commercial parks in the valley have a combined area of 242 acres. They vary greatly in size and consequently in unit space per person. During a busy holiday week-end, some are intolerably crowded and the opportunity for quiet relaxation and leisurely contemplation is at a minimum. Those people who are attracted by the hustle and bustle of large crowds and the opportunities for personal contact that they offer are likely to find such conditions ideal. However, the person who seeks quiet retirement from the pace of daily life, and passive rather than active recreation, is likely to be disappointed.

These parks, with few exceptions, are designed to satisfy the recreation demands of day picnickers. Only a few provide extensive facilities for overnight and week-long cottagers and tent or trailer campers.

The facilities offered in the commercial parks vary from good to poor with respect to available space, swimming and playground equipment. Many provide a minimum of facilities which the paying public accepts largely because of lack of convenient alternative space. Some operators maintain high standard establishments.

The accompanying map indicates the distribution of these parks in the valley. Of the 26 commercial parks in the watershed, 16 are located in the Central Hilly Belt. The remaining 10 are situated along the banks of the lower reaches of the Grand below Brantford.

The development and distribution pattern of these parks has resulted from the interplay of a number of social and

economic factors which are of a varying degree of importance in each individual case. Nevertheless, certain broad trends can be noted from the results of field investigations.

Basically, there must be a sufficiently dense urban population in the surrounding area to make a commercial park a profitable undertaking. No conclusive evidence is available as to the number of people necessary within a given radius to make a park a sound business proposition. In addition, a multiplicity of factors other than mere numbers would have to be considered. However, few parks in the Central Valley Belt are more than 15 miles from large urban centres.

There must be direct access to these commercial parks over good roads, since these developments are directly dependent on the motorist in most cases.

It should be noted that regular bus and train services along given routes do not affect the distribution of the commercial parks, since they depend almost entirely on the motorist. Buses are sometimes chartered for picnics and excursions to these parks, but the transport companies do not operate regular services to them in the summer months. As a result, many urban residents who do not own cars find it difficult to utilize any of these recreation facilities which are located far beyond city transport services.

The commercial park should possess enough attractive scenery to warrant development. However, the pressure for recreation space is great at the moment, and it is surprising how little the public demands in this respect. Some of the parks offer little more than a few shade trees beside badly polluted streams and a roughly mown field for parking and sports activities. Swimming is impossible at most of the sites and the boating is poor or non-existent at many. The commercial parks at Puslinch Lake are an exception to this generalization.

As stated previously, these parks are mainly patronized by the motorists. Most cannot be conveniently

reached by public transport systems. This aspect of commercial park development stands in sharp contrast with similar facilities in Europe where excellent public suburban transport services carry thousands to river, lake and seaside recreation areas.

It should be noted that those parks which are located in the Central Hilly Belt are designed mainly to satisfy the demand of the urban centres of the Middle Grand, whereas the Grand Gorge at Elora and the splendid scenery of the Rockwood area attract many week-end picnickers from Toronto and Hamilton. Park Haven Lake Resort in Blenheim Township, at the western extremity of the watershed, draws many from the neighbouring city of Stratford. Nevertheless the residents of the Grand make up the largest proportion of the visitors to the commercial parks of the Middle Grand River area.

On the other hand, commercial parks situated on the banks of the Lower Grand draw the majority of their customers from greater distances, and generally from points outside the watershed, such as Hamilton and the Buffalo-Niagara area. Some operators draw 80 per cent of their business from these outside communities. Residents of Brantford make relatively little use of these facilities.

Barber's Beach

This park, which is located about two miles east of Hespeler, fronts on a part of the north shore of Puslinch Lake. While the total area involved in this development is approximately 72 acres, only 35 acres of the property are actually used for park purposes. The remainder of the land is rented for private cottage sites.

There is ample open space at this park for playground uses and parking purposes. The shores of the lake and margins of the property are well endowed with shade trees. The sandy beach is now in good condition since the owner has spent money and effort in the improvement of the waterfront. The warm waters of the lake are excellent for swimming.

On the lakefront there is a recently enlarged and modernized pavilion, which contains an excellent dance and banquet hall in the upper storey, in addition to a refreshment booth and changing and checking facilities in the lower level. A large number of picnic tables have been placed in the shady sections of the park. Swings and teeter-totters are provided for children. A number of boats are available for hire.

A section of the park is rented to campers with tents and trailers. Some stay only a short time while others remain during most of the summer season.

This park has an annual attendance totalling at least 50,000 people. About 6,000 people attend this park on a hot summer Sunday. There are always a few hundred visitors during fine summer weekdays. While some people from distant places use these park facilities, the customers are mainly drawn from Hespeler, Preston, Galt and Guelph.

Admission charges to the park are reasonable, the rates being 10 cents per person and 25 cents per car. No charge is made to those arriving on foot or by a chartered bus for picnic activities. Charges are usually only levied on Wednesdays, Saturdays, Sundays and statutory holidays. During the remainder of the week, when the attendance is low and largely children, no charge is made.

Butler's Beach

Butler's Beach, which is about forty acres in size, is situated on the north shore of Puslinch Lake just a little over two miles east of Hespeler.

A large level field is available for sports activities and the swimming in the lake is excellent. A small eighteen-hole miniature golf course has been built in the park area. A number of picnic tables are scattered throughout the grounds. Swings and children's play apparatus are available.

The old frame hotel, which was built before the turn of the century, is still standing, but guests are no longer accommodated here. A boathouse and modern store have been erected at the lakefront.

Admission charges are 25 cents per car and 10 cents per person. On a busy holiday about 2,000 people will visit the park. The total seasonal attendance is estimated at 5,000 people.

. Park Haven Lake Resort

This recreation development is located on a small pond on the western boundary of the watershed approximately seven miles north-east of Woodstock.

The well-shaded picnic grounds are equipped with tables, swings and slides. However, no large open playing-field is available. A new two-storey building, with a dance hall above and a refreshment booth below, has been built. A modern boathouse has been erected at the lakefront. Although the waters of this 40-acre lake are clear and warm, the marl and mud bottom makes it unsatisfactory for swimming. At the time this site was visited, the owner was constructing a swimming-pool.

No charge is levied at the park for parking purposes, and on a holiday about 150 people are usually in attendance. The Saturday night dances at this resort draw a large crowd. Total attendance at the park for picnic purposes must be about 1,500 people.

. Barkat's Farm

This picnic site is located on the banks of the Middle Grand to the west of Bloomingdale.

A number of picnic tables are set out on a grassy flood plain and outdoor toilets erected.

The admission charge is 25 cents per car. On a busy holiday up to 100 cars will arrive at the park. Total seasonal attendance is approximately 800 cars.

. Everglades Park

This park is situated about four miles south of alt between the riverfront and Highway No. 24. About 13 acres

land have been extensively developed for recreation purposes. Fully equipped children's playground is available and there is a large open field for sports activities. Picnic tables and a refreshment booth have been placed in the park. There is no swimming at this site, but a cement wading pool has been constructed for the children. An excellent outdoor dance floor and bandshell have been built. Thirteen cabins have been erected along the riverfront for rental purposes.

The annual attendance at this park is approximately 50,000. Because of its central location and the wide variety of facilities offered, the park is frequently used for industrial and church picnics. The main body of patrons are drawn from Brantford, Kitchener, Guelph and Hamilton, but not, as one might expect, from the neighbouring city of Galt.

Willow Lake

This development is situated on the west bank of a small mill pond at Doon in Waterloo Township. The pond provides good swimming. A small beach has been developed here, a safe bathing area marked off with buoys, and a slide and diving tower constructed. Picnic tables have been set out along the shady banks of the pond and a refreshment booth built. Eight cabins with housekeeping accommodation are available for rental by the week and the demand for them is heavy, since the rates are reasonable.

Admission charges to the park are 10 cents per adult and 15 cents for an automobile. On a busy holiday, about 1,500 people will attend the park. The total seasonal attendance is about 10,000 persons.

Keuppser Park

This recreation area lies on the banks of the Donestogo River about two miles west of St. Jacobs. A dozen picnic tables have been placed along a grassy bank of the river. As the site is deficient in shade trees, a few hardwoods have been planted.

The park has only been operating for a few years and the total attendance is estimated at about 200 cars season. The patrons are drawn mainly from the Kitchener-Waterloo area.

. Old Mill Park

This park is situated on the east bank of the Humber River in the northern part of the city of Guelph. The rapid development of Guelph in the last few years and the recent annexation of land have changed the nature of this park from a rural recreation area to a privately owned park in an urban setting.

The seventeen acres of land associated with the development provide ample space for playing-fields, picnic tables and parking areas. An excellent swimming-pool 150 feet long and about 30 feet wide has been constructed. Dressing and changing rooms have been built, along with a refreshment pavilion. A dance hall is also operated by the owners of the park.

There is no charge for entrance to the park. Very reasonable rates are charged for entrance to the pool - 10 cents for adults and 5 cents for children. On a fine holiday at least 1,500 people will attend the park. Since it is within easy reach of all the citizens of Guelph, it performs many of the functions of a municipal park.

. River Bend Camp

River Bend is situated on the banks of the Speed River about five miles south of the city of Guelph. About ten acres of land are utilized for recreation purposes. A large number of picnic tables have been set out in the north-west corner of the park and an open-air grill and kitchen are available. Swings, teeter-totters, benches, horseshoe pits and a small ball diamond have all been built. A good spring on the site provides drinking water. Four small cabins, two of which are converted streetcars, are available for renting. Swimming at the site is poor because the river is shallow, weedy and dirty.



This beach on Puslinch Lake is part of a very popular commercial park with a wide variety of recreation facilities.



Boat rental establishments on the lower Grand River such as this in the village of Cayuga, are numerous.

There is no charge for admission to the park. The estimated attendance is 1,500 persons per season and a large percentage of these people are from Guelph.

10. Dawn Valley Park

This commercial development, which is situated on the north bank of Whiteman's Creek about a half mile from its junction with the main Grand River, contains about three acres of cedar-covered river flats, on which a half a dozen picnic tables and a roughly constructed refreshment booth have been set up and are available for public use. The creek is suitable for wading at this point but is not deep enough for swimming. There is no large open playing-field.

The admission fee to the park is 25 cents a car and 10 cents a person. Most of the customers come from Brantford and, to a lesser extent, from Paris.

11. Glenecho Park

This small park is situated on the banks of Whiteman Creek, immediately opposite Rest Acres Park which is owned by the City of Brantford.

A number of picnic tables are scattered between cedar groves on the flat sandy river bank of the creek. No swimming is possible at this site but the pool at Rest Acres is nearby. Although not nearly so fully developed as some commercial parks in the watershed, the neat, clean and freshly painted appearance of the site is an obvious attraction.

12. Crystal Beach

This recreation development lies about a half-mile to the north of Highway No. 24, approximately six and a half miles south of Brantford. It has been developed on 27 acres of land surrounding an abandoned wet gravel pit and is the only example on the Grand Watershed of the conversion of such a feature to recreation uses. The clear warm waters of the pond, which are 15 feet deep in places, are ideal for swimming. A safe bathing section at the north end, which has

been buoyed off and equipped with a diving-board, is supervised by a lifeguard. The bass fishing in the pond attracts many visitors.

About ten picnic tables have been placed in the park and a central refreshment booth erected. An open-air dance floor was built on high land overlooking the pond, but this was not in operation in 1953.

The entrance charges, which are 15 cents for adults and 10 cents for children, are reasonable considering the conveniences of the site. On a busy holiday 800 people may visit the park and the total occasional attendance is about 8,000. The majority of the customers come from Brantford, but there are some steady visitors from Hamilton. Tobacco workers augment the attendance during the picking season.

13. Bell's Picnic Area

This park is located on the west bank of the lower reaches of the Grand River about two and a half miles north of the village of Cayuga. It is not an elaborate development. A small riverfront area, which is well endowed with shade trees, is open to the public for picnic purposes. Few facilities are provided and admission charges are listed as 50 cents a car.

14. Bruce's

This development is situated on the south bank of the Grand River about halfway between Dunnville and Cayuga. Although the main interest of the operator lies in the rental of boats, three or four picnic tables are set out on the banks of the river and a refreshment booth has been constructed.

The attendance at this park solely for picnic purposes is not large. Most of the patrons come to the site to rent boats for fishing and hunting. The admission charge is 25 cents per car, but no entrance fee is levied if boats are rented.

15. Conway Park

Conway Park, which is situated on the east bank of the Grand River about a hundred yards south of Highway No. 3, lies within the village of Cayuga. About three acres of level riverfront land, which is shaded along the banks with large willow trees, has been developed for park purposes. The Grand River is unsuitable for swimming, but the broad expanse of water at this site is ideal for boating.

About eight picnic tables have been placed in the park, swings erected and a small playing-field provided. A large refreshment booth has been built at the entrance to the park. Eight boats are available for hire. In addition, seven small cabins have been built on the site for rental purposes.

The total yearly attendance at this park is about 2,000 and on a busy holiday about 200 people are usually present. About 70 per cent of the customers come from Hamilton.

16. Grand Banks

Grand Banks is situated on the east bank of the Grand River about a mile north of the village of Cayuga.

The 15 acres of parkland is located for the most part on a well-wooded but rather steeply sloping river bank. No open playing fields are available. Eight picnic tables are scattered along the shady bank and a central refreshment booth has been built. Teeters and swings have been installed for the children. Five boats are available for rental. Eight private cottages have been built on land leased from the owner.

Although there is no admission charge at this park, the annual seasonal attendance is only about 300 cars. Even on a holiday attendance is not usually above 25 cars. The majority of the patrons are from the Hamilton area.

17. Mellen's

This small park is located on the north bank of the Grand River a little over three miles above Dunnville.

Picnic tables and swings are provided, but there is no refreshment booth. Five boats are available for rental and this is undoubtedly the main attraction of the area.

Total attendance at this park during an entire summer is not over 100 cars. Parking fees are 50 cents per car. The patrons come mainly from Hamilton and Buffalo.

18. Pettigrew's

This recreation development is situated on the north bank of the Grand River about five miles above Dunnville.

About nine picnic tables are placed on the more shady sections of a grassy bank of the river. A refreshment booth has been built. A large boat rental business is operated from this site, with 33 boats being available.

On a good summer holiday 65 or 70 cars will be found here. Total seasonal attendance is about 700 cars. The majority of the customers are from Hamilton and Buffalo.

19. Riverside Park

This commercial park is situated on the north-east bank of the Grand River about two and one half miles upstream from Caledonia. Ten picnic tables have been set out beneath willow shade-trees along a flat grassy bank of the river. A refreshment booth has been erected immediately across the road from the park.

The admission charge is 25 cents a car. Club picnics make frequent use of this site. The total seasonal attendance is estimated at 1,200 people.

20. Riverside Park, York

This recreation area, about five acres in extent, is situated on the banks of the Grand River immediately south of York.

Sixteen picnic tables have been set out under willow trees along the bank of the river. The grass is kept well mowed but no special recreation facilities are provided.

The river is too dirty and muddy at this point for good swimming. A small refreshment stand is located immediately adjacent to the highway.

The admission charge to the park is 25 cents a car. On a holiday about 60 cars will arrive at this park. Total seasonal attendance is estimated at approximately 2,500 people.

21. Riverview Park

This small park area is situated on the east bank of the Grand River immediately south of Highway No. 3, and actually lies within the village of Cayuga.

Five picnic tables are placed along the riverfront and a small refreshment booth has been erected. The park development is supplementary to a boat rental business operated from this site.

22. Tanner's Cozy Cove

Tanner's is situated on the banks of the lower Grand River just south of Caledonia. Ten picnic tables have been set out in the shady sections of a three-acre recreation area. A small refreshment booth has been erected. Swimming is not too good but boats are rented from the park.

The admission fee is 25 cents a car. Total attendance at the park for picnic purposes is about 350 cars a season.

23. Boat Rental Facilities

There were approximately 14* major boat-hire outlets in the watershed in 1953. Ten of these were located on the banks of the lower reaches of the Grand River south of Cayuga, while the remainder were found on the scattered small lakes of the Central Hilly Belt. In all, there were over 200

* The map indicating the distribution of commercial parks in the Grand Valley shows the location of many of these establishments, since both types of business are often operated concurrently.

boats for hire in the watershed in 1953 and about 80 per cent of these were found on the Lower Grand.

BOAT RENTAL FACILITIES

Operator	No. of Boats for Hire	Rates per Day \$
<u>Lower Grand River</u>		
Bruce's	15	1.00
Chanticleer - Dunnville	6	1.50
Clay - Port Maitland	8	4.00
Conway - Cayuga	8	1.50
Humbecker - Dunnville	23	2.00
Mellen - Dunnville	5	1.50
Moss - Port Maitland	50	2.00
Pettigrew - Dunnville	33	1.50
Riverview - Cayuga	24	1.25
Tanner's - Caledonia	5	1.25
<u>Central Hilly Belt</u>		
Barber's Beach - Puslinch Lake	12	
Butler's Beach - Puslinch Lake	16	
Hofstetter Lake	7	1.50
Park Haven - Blandford Tp.	7	1.50

In the main, the boats are rented for fishing and duck-hunting. Pleasure boating is insignificant with the exception of Puslinch Lake. In most cases the boats hired are not equipped with motors. The customers are expected to bring their own power units. Some operators will not rent boats to hunters for fear of damage, while others rely on their business in the duck season. At Port Maitland eight large boats equipped with motors and designed for perch fishing in the open waters of Lake Erie are available for rent.

Canoe rental has not been developed to any large extent in recent years. The polluted nature of the streams renders many areas unsuitable for pleasure trips and, for a novice, the canoe is a dangerous craft for fishing or hunting. At the turn of the century canoeing was very popular on the broad waters of the lower parts of the Grand River, but this has now almost completely died out.

The rates of boat hire are reasonable in all cases and vary from \$1 to \$2 per day. However, the owner may rent the same boat two or three times a day at these rates. It may be hired out to one person for fishing until noon and then hired out again in the afternoon. Few operators rent boats on an hourly basis because of the trouble of keeping track of charges. Conway's, who rent boats at 50 cents per hour (35 cents for each succeeding hour), are a notable exception.

The peak months of operation are June, July and August, but some operators, such as Pettigrew's, begin business about May 15, and continue through the duck season until the end of October.

The majority of customers for the boats of the Lower Grand come from beyond the watershed - in particular, from Hamilton, Niagara Falls and Buffalo. The American business reported by operators varied from 20 per cent to 80 per cent and perhaps averages about 45 per cent of the total for the area. The boat-hire operators of the rest of the Grand Watershed rely mainly on local customers.

There is considerable room for expansion in this business in the Central Hilly Belt of the valley. The improvement of summer flow conditions in the streams and the amelioration of the pollution of the main Grand River would greatly improve the boating of the river. The introduction of canoes for rent should prove popular in some localities.

CHAPTER 6

PERMANENT SUMMER CAMPS

The picturesque nature of the Central Hilly Belt contributes greatly to its hiking and camping possibilities. Many of the deep, broad and well watered valleys, with their dense cover of conifers and scattered hardwoods, are a miniature approximation of Northern Ontario forest conditions, and for this reason are particularly attractive to youth groups who attempt to recapture a portion of our pioneer environment in their outdoor recreation. Some of the small scenic lakes and ponds, nestled between well kept rolling farmlands and encircled by beautifully wooded slopes in their immediate approaches, are ideally suited to permanent camp development. The warm clear waters provide excellent swimming and the surrounding landscape abounds in recreation potentialities. As a result, the Central Hilly Belt, possessing satisfactory recreational resources which are readily accessible to urban population concentrations, was seized upon by camp organizations at a relatively early date.

1. Belwood Camp Lodge

This camp, which is operated by the Kitchener Lions Club, is situated on five acres of well drained rolling land fronting the north shore of Belwood Lake. Sufficient space is available for playing fields and the lake can be used for aquatic sports, but towards the end of the summer season the low level of the water can be a serious handicap.

Six cabins have been erected on the property for sleeping accommodation. A central dining-hall, 18 feet by 36 feet and with a total capacity of fifty people, has been built.

This camp can provide accommodation for approximately fifty boys at any one time. The total seasonal registration at the camp is usually about 200 and the average stay for each camper is two weeks.



2. Fergus Boy Scouts Camp

The Fergus troop of Boy Scouts have a permanent camp site on three acres of land at Belwood Lake. Up to the present time only limited improvements have been made on this property.

3. Guelph Kiwanis Camp

This camp development is operated on 14 acres of land on the north shore of Belwood Lake.

The camp is organized around an old stone house located on the property. Ample playing fields are available. The aquatic program of the camp is handicapped at certain seasons by low water levels in the lake.

4. Ki-Wa-Y Camp

Camp Ki-Wa-Y, which is owned and operated by the Kitchener-Waterloo Kiwanis Clubs and the YMCA, is situated on 59 acres of land fronting on Paradise Lake in Wellesley Township.

The property, which contains sufficient open land for playing fields, is somewhat deficient in forest cover. The excellent swimming in the warm waters of Paradise Lake is one of the outstanding features of this camp. No other camp in the watershed has better natural aquatic facilities.

Eleven cabins have been erected for sleeping accommodation. A central dining-hall 100 feet by 40 feet, with a capacity of 150, has been constructed.

The total number accommodated at one time is 150 and the average stay is two weeks. The total seasonal attendance is about 600.

5. Braeside Pentecostal Camp

This church camp is situated on 14 acres of land on the east River Road about two miles north of Paris. The organization also owns an additional 75 acres of adjoining farmland which is not yet used for camp purposes.

The property is almost entirely on flat well drained land with a sufficient covering of hardwood shade trees. There is enough land for playing fields but no swimming facilities are available at the site. It is necessary to take the children to a swimming hole in the Nith River about six miles away.

This camp is the most heavily used and one of the most extensively developed in the entire watershed. Sleeping accommodation is provided in about 50 cabins and ten tents. A central dining-hall 60 feet by 60 feet with a total capacity of 500 has been erected. A large wooden tabernacle which will hold 2,000 people has also been built. In addition to these camp facilities, a large number of private cottages have been constructed on this camp site.

The average stay at this camp is two weeks and the total seasonal attendance is about 1,000. During the month of July three camps are conducted - a junior boys' and girls' camp, a youth camp, and an adult camp. The cottagers who stay here for varying periods during the summer further augment the attendance, as do those who come to the religious services at the tabernacle on Sundays.

6. Crehwing Scout Camp

This boys' camp, which is situated on the Nith River about a mile south of Wellesley, is owned and operated by the Perth District Boy Scouts and Cubs.

The site is located on a steeply sloping but well wooded bank of the river. Although the Nith River is used for swimming the aquatic facilities are not good.

Six cabins and a number of tents comprise the sleeping accommodation. The camp accommodates about 30 boys at one time and the average stay varies from one to three weeks. The total seasonal attendance is about 140.

7. Peacehaven Scout Camp

Peacehaven is located on 28 acres of land a short distance from Drumbo and is owned by the Boy Scouts Association of South Waterloo.

The camp, situated on a level expanse of valley bottom land, is enclosed on the south and west by steep banks of the Nith River which are fifty to sixty feet in height. The Nith River, which flows through the southern end of the property, is used for swimming.

Tents are used for sleeping accommodation at this camp and the number in use at any one time varies greatly. There is a central dining-hall 20 feet by 40 feet with a capacity of 100.

The average stay at this camp is one week and the total seasonal attendance about 200.

8. Blue Springs Scout Reserve

Blue Springs, owned by the Provincial Council of Boy Scouts of Ontario and operated as a training centre for leaders, is situated on 100 acres of land in Nassagaweya Township, between Acton and Rockwood just south of Highway No. 7.

The camp lies astride a well wooded section of the broad and deeply entrenched valley of Blue Springs Creek. A section of the creek has been dammed to create a small pond for swimming purposes but the constantly cold temperature of the water is a handicap.

The sleeping accommodation is confined to tents. A central dining-hall 40 feet by 24 feet with a capacity of 100 has been erected. The log palisade, gates and blockhouse which form the entrance to the site are a unique feature.

The number usually accommodated at the site at one time is about 35. The property is used also for week-end jamborees when upwards of 150 use the camp.

9. Camp Brébeuf

This church camp is owned and operated by the Hamilton Diocese of the Roman Catholic Church. The site, which is close to Rockwood, is 10 acres in extent but the organization also owns an additional 100 acres of adjacent farmland. The property, which lies adjacent to the Eramosa River, embodies a variation in topography which is suitable for camp requirements and contains good conifer cover in the valley sections.

Cabins have been erected for sleeping accommodation and a central dining-hall 40 feet by 50 feet with a capacity of 120 persons has been built.

The average stay at this camp is two weeks and the total seasonal attendance averages about 360.

10. Edgewood Park Lutheran Camp

This camp, about 34 acres in extent, is located just outside Everton on the Eramosa River. There are ample flat lands here for playing fields and satisfactory shade from the dense conifer and scattered hardwood cover of the area.

Eight cabins and nine tents provide the sleeping accommodation. A central dining-hall 60 feet by 45 feet with a capacity of 120 has been erected. In the spring of 1952 a new cement swimming pool 38 feet by 58 feet was built. The water for the pool is pumped from the Eramosa River.

The total capacity of this camp is about 120. The average stay varies from one to two weeks and the total seasonal attendance is approximately 200.

11. Everton Cub Camp

This development is located on 200 acres of land immediately south of Everton.

The property, through which the Eramosa River flows, contains an excellent balance of high and dry terrain and cedar-covered valley bottom land. There is ample open space for playing fields and also sufficient woodland for various nature activities.



Photograph Courtesy C. V. Nunns.

The entrance to the Blue Springs Scout Reserve is flanked by a palisade of pointed stakes and commanded by an authentic replica of an old block-house built of squared logs and complete with overhang and rifle slits. The Reserve is owned by the Ontario Boy Scouts Association and is the training centre for Boy Scout leaders.

A large central building has been erected on the property and contains dormitory sleeping accommodation. The dining-room, which is 60 feet by 30 feet, has a capacity of 100. A fine cement swimming pool has been constructed.

The total capacity of the camp is about one hundred. The average stay of the campers is one week and the total yearly attendance is about 450.

12. Five Oaks Camp

The camp, which is now owned and operated by the United Church, is situated at the junction of Whiteman's Creek with the Main Grand River just a few miles north of Brantford. The 25 acres of land associated with the camp contains a variety of shaded valley slopes and level river bottom land. There is ample flat open space for playing fields.

There are 11 cabins available for sleeping accommodation. A central dining-hall of 40 feet by 40 feet will seat 120. Whiteman's Creek has been dammed just before its point of entrance into the Grand River and a satisfactory swimming pool has been thus created.

About 100 people may be accommodated at this camp at one time. The average stay of the campers is two weeks and during the entire season the total attendance is approximately 400. Before the camping season begins this site is frequently used for Sunday School picnics and occasional week-end camps.

13. Camp Kvutza

Camp Kvutza, situated in Sherbrooke Township and fronting the shore line of Lake Erie a short distance to the east of the mouth of the Grand River, is a Jewish youth camp serving the Toronto, Hamilton and Buffalo areas.

The camp, which is 148 acres in area, has ample room for playing fields and sufficient space for future expansion. The swimming in Lake Erie is excellent.

The sleeping accommodation consists of five cabins and seventeen tents. A central dining-hall 40 feet

by 100 feet has been erected. A number of private cottages have also been built on this property.

The total capacity of the camp is ²³⁰145 and the stay of the campers varies from ⁸one to ⁸six weeks. Total seasonal attendance is about 180.

14. YWCA Camp

This camp, situated on the shoreline of Lake Erie a few hundred yards to the east of the mouth of the Grand River, is owned and operated by the Hamilton division of the YWCA.

Twenty-seven acres of flat land are well covered with shade trees and considerable playing space is available. Swimming in Lake Erie is excellent and the camp is fronted by a beautiful sand beach.

Sleeping accommodation consists of dormitory, two cabins, and one cottage. A central dining-hall 60 feet by 28 is available.

The total number accommodated at any one time is 85. The average stay is two weeks and the total seasonal attendance is about 260.

15. The Youth Hostel Organization

Mention should be made of the Youth Hostel movement in the watershed. This organization, an offshoot of a much greater development in Europe and the British Isles, is still in the early stages of development in Southern Ontario, with about 700 members and 18 hostels in the province.

In their general plan for Ontario, the Youth Hostels Association visualize a circular chain of hostels from Toronto to Algonquin Park, across the Muskoka area to Georgian Bay, down No. 11 Highway to tie in with existing developments in the Hamilton - Niagara Falls area. To be of any practical value, hostels should be 10-15 miles apart for those travelling on foot, and 25-30 miles for those using bicycles.

Hostels have already been set up at Blair and Blue Lake; but these are only the beginning of a chain that the Association would like to establish along the Grand River and its tributaries.

Should this organization approach the Authority with constructive proposals, they would be worthy of consideration. Their support of the recreation program, even though they are few in number at present, would be an important force for good, owing to their enthusiasm for outdoor recreation and their understanding of properly conducted relationships with rural groups. They would probably not be averse to lending some manual assistance in recreational developments.

CHAPTER 7

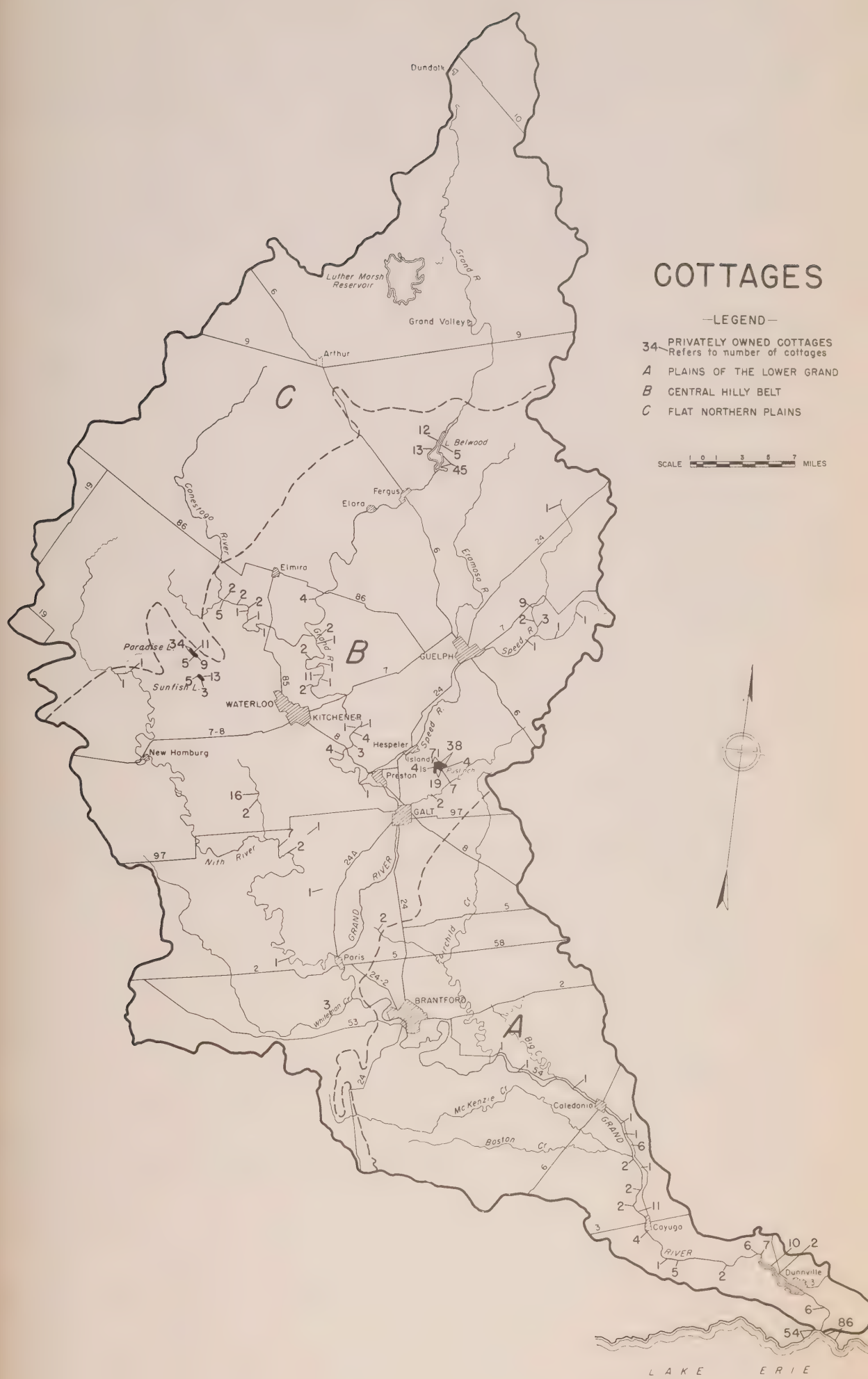
SUMMER COTTAGES

During the sixty or more years of cottage development in Southern Ontario, many radical changes have occurred in the number, design and distribution pattern of summer properties. Prior to 1900, summer cottages were mainly the prerogative of the wealthy and hence their number was limited. Due to various circumstances, they have shown a phenomenal increase since 1920.

Shorter working hours and paid vacations have given people the leisure hours and the financial means to utilize cottage facilities. The ever-increasing noise and congestion of the rapidly growing urban centres and the fatigue and strain of the intensive pace of commercial and industrial life make heavy demands on the physical energy and mental health of the people. For many, the cottage is the necessary oasis of recuperation. Furthermore, the general relaxation of the "Sunday Blue Laws", in part brought about by the cottage movement itself, has added to the week-end attraction of the cottage for many people - especially the younger folks.

The advent of the automobile and the development of an improved highway network into the more northerly areas of the Province have enabled people to travel great distances in relatively short periods. These trends have been basic to the cottage movement throughout the Province, and without them the Northern Ontario recreation development could not have reached its present proportions.

Up to the present time the Ontario and American cottage owners have been mainly attracted to the shores of the Great Lakes, especially Lake Huron, Georgian Bay and Lake Erie; or to the lakes and rivers in the Canadian Shield and its southern margins. The attraction of the northern coniferous forests and the lake-studded rocklands seemed irresistible. Only the beautiful sandy beaches found along the shoreline of



the Great Lakes could compete with the attractions of the northland. The rolling hills and valleys of the Ontario farmlands were almost completely by-passed, and their recreation value overlooked.

In recent years, cottagers are beginning to turn their attention to the development of sites in the more settled parts of rural Ontario which are closer to urban centres of population.

The valley of the Grand River and its tributaries will undoubtedly become a highly favoured location in the near future. The Central Hilly Belt will prove very attractive to local urban populations. The rate at which riverfront property may be closed to public access could create serious problems within a short time.

According to postal statistics for 1951, there was one cottage for every 174.8 people in the cities of the Grand Watershed, as compared with one for every 57.4 in Toronto or 1 for every 312 people in Ontario as a whole.

About 74.5 per cent of all cottage owners resident in the Grand Valley live permanently in Brantford, Guelph or Kitchener. Brantford, with one cottage owner for every 149.2 people, shows the most favourable ratio of the above cities. In Guelph there is one cottage for every 161 people; Kitchener, one for every 247.8; Waterloo, one for every 292.1.

The accompanying table offers ample statistical proof of the tendency of the residents of the Grand Watershed to by-pass the surrounding potential sites close to their home communities.

Location of Cottages of Residents of the Grand Watershed*

<u>Location of Cottages</u>	<u>Per Cent of Total</u>
Muskoka-Parry Sound	25.4
Haliburton	.4
Remainder of Canadian Shield	.4
Erie shore	22.1
Huron shore	20.6
Bruce Peninsula	11.7
Georgian Bay	7.5
Lake Ontario	.3
Lake Simcoe	2.2
Grand Watershed	7.5
Rest of Ontario	1.9
	<hr/>
	100.0

The attraction of the Muskoka-Parry Sound area of the Canadian Shield is very marked, while the Great Lakes shoreline has certainly received its share of cottage development, since 61.9 per cent of the cottage owners living in the watershed have located here. It will be noted that the cold waters of Lake Ontario have had little attraction for cottagers. Only 7.5 per cent of all the cottages are to be found on its shores.

Within the Grand Watershed and the area of the shoreline of Lake Erie which was studied[†], there are about 650 cottages. About 22 per cent are located on the lakefront and 78 per cent within the watershed. It will be noted that the three-mile stretch of the Lake Erie waterfront has about a quarter as many cottages as the entire 22,900 square miles of the Grand Valley. The strong attraction of the Great Lakes that was noted in the general analysis of the Post Office statistics is again evident in this more detailed field study.

* This table was compiled from an analysis of Post Office statistics. While it is known that these figures are not absolutely accurate, the general trends revealed are in keeping with the facts.

† The shoreline from the mouth of the Grand River to Naval Reserve No. 24 in Sherbrooke Township and the lakefront from Port Maitland to the west as far as Con. V, Lot 19, of Dunn Township are included in this study.

Of the total of all summer cottages within the Grand Valley, approximately 42 per cent are situated on three small lakes in the Central Hilly Belt, namely Paradise, Sunfish and Puslinch Lakes. Puslinch Lake, with 31 per cent of all cottages within the watershed, has been particularly popular.

Another 24 per cent of the summer properties are located at two points of ponding in the river system, namely the Shand Reservoir and the old mill pond at New Dundee. The major development of this type is, of course, at the Shand Dam where over 20 per cent of the cottages of the valley are situated.

About 38 per cent of the cottages in the Grand River basin have been built along the banks of the vast network of the streams throughout the area. Over half of these are located along the banks of the lower reaches of the Grand River where the waters are relatively broad and deep.

Distribution of Cottages in the Grand Watershed

Inland lakes	42%
Ponds and reservoirs	24%
Lower Grand River	20%
Rivers of Central Hilly Belt	14%
	<hr/>
	100%

These figures indicate that people have neglected to a great extent the possibility of cottage development on smaller streams. The larger bodies of water have been preferred even though the privacy they offer may not be so great.

The smaller streams are likely to increase in importance in the near future. The better sites at Puslinch and Paradise Lakes have been largely taken up, and in a very short time people will be forced to look elsewhere. As the control of pollution is improved on the rivers and the summer flow increased, the smaller streams will become more attractive.

Since there is a decided preference for the larger bodies of water, it is likely that there will be a heavy

demand for cottage sites on future flood control reservoirs. The fact that the waters of Lake Belwood fluctuate during the summer months has not prevented many people from building cottages on the shores.

The place of permanent residence of the cottage owners is also of interest. In the total study area, including both the Grand Watershed and the three miles of the shore of Lake Erie, the following pattern is revealed. Approximately 32.4 per cent of the owners come from areas beyond the watershed, and 6.2 per cent of these are Americans. The remaining 67.6 per cent are residents of the watershed.

When the Lake Erie cottage developments and those in the interior of the watershed are considered separately and compared, some very interesting facts are revealed. The percentage of owners along the Lake Erie shoreline from various areas are shown in the following table.

OWNERSHIP OF COTTAGES ALONG THE LAKE ERIE SHORE

Residence	Percentage	Group Percentage
Buffalo Niagara Falls Rest of U.S.A.	10 6 4	Americans 20
Toronto Hamilton Niagara Peninsula	4 41 6	Ontario out- side Watershed 51
Dunnville Rest of Watershed (Galt)	25 .. 4	Residents of Watershed 29
Total	100	100

Cottage development in the Grand Watershed has not progressed at an even rate throughout the entire area. Construction has taken place in a series of isolated pockets, commencing at various periods in the past 55 years and proceeding at widely differing rates throughout the ensuing period.



Recent cottage developments along the east bank of the lower reaches of the Grand River in Canborough Township.



The islands and shoreline of Puslinch Lake have been extensively developed for cottage sites.

Development began very early at Puslinch Lake and along the shoreline of Lake Erie in the vicinity of Port Maitland. In both these cases it preceded the advent of the automobile and followed in the wake of a summer-resort hotel.

About 14 per cent of the cottages in the area studied along the Lake Erie shoreline were erected between 1900 and 1910. Approximately 27 per cent of the cottage development at Puslinch Lake occurred between 1915 and 1920. In both these cases there was a regularly established transport pattern to the area from established centres of population at Dunnville and Guelph.

In the decade between 1920 and 1930, Paradise Lake, Sunfish Lake and New Dundee all saw the beginning of cottage development and by this time some of the stream banks of the watershed were being utilized as cottage sites.

In two areas, namely Belwood Lake and the Lower Grand, development did not commence until the decade 1940-50. The Shand Dam was not open for cottage building until 1943. Development on the Lower Grand did not really begin until the decade 1941 to 1950 when sites on the lakefront became more difficult to obtain. However, it has progressed very rapidly since then, and shows the highest percentage increase in cottage construction of any area in the watershed between 1951 and 1953.

The streams of the Central Hilly Belt began to be used as cottage sites about the middle of the twenties, but during the decade of 1920-1930 only about 15 per cent of the present development took place. The major part of the construction has occurred since 1930.

The future development will be, for the most part, along the river courses. Most of the Lake Erie shoreline in the vicinity of Port Maitland is now filled, with the notable exception of the limestone shoreline in Dunn Township. Puslinch, Paradise and Sunfish Lakes will undoubtedly undergo further cottage development along the few remaining sections of the waterfront and in the rear of the present cottage sites.

However, the best sites will very soon be occupied. Those people who look for sites in the Central Hilly Belt will turn in increasing numbers to the smaller rivers of the watershed.

The banks of the Lower Grand River will probably undergo very intensive subdivision for cottage sites in the next few years. The majority of the new cottage owners will likely be from areas outside the watershed. If the present trends continue, Hamilton residents will predominate. Some Americans may construct cottages for a few miles along the riverbank above Dunnville, but it is too early to draw any positive conclusions from trends which are setting in.

Once cottage developments invade an area, they are likely to progress rapidly. The studies carried out in the past two years on the Grand Watershed provide ample evidence of this fact. Although these summer dwellings began as early as 1900 on the Lake Erie shoreline, the movement did not really get under way throughout the valley until the 1930's. In actual fact, over 75 per cent of the development took place in the 12 years between 1941 and 1953.

The rapid expansion of summer properties is particularly significant for municipalities upstream who will soon feel the full impact of the cottage movement. Local officials should realize at once the need for guidance and supervision of riverfront subdivisions.

Care must be taken to prevent the construction of cottages on sites that are likely to flood in periods of peak flow or be subjected to serious ice jams. It must be remembered that urban dwellers coming into the area in June or July in search of cottage sites often have not the slightest idea of the dangers of flood and ice at other seasons. In addition municipalities must guard against the erection of sub-standard buildings crowded together on lots of insufficient size.

There is ample legislative machinery in existing provincial statutes to control subdivision and building standards

if only the municipalities will make sufficient use of it. The democratic approach to planning demands that initial action be taken by the municipalities through the passing of adequate local by-laws.

The municipalities should immediately begin surveys and studies leading to the formation, adoption and approval of an Official Plan for the development of their areas as provided for under Sections 8, 9 and 10 of The Planning Act, R.S.O. 1950, quoted hereunder. This is the only logical procedure to adopt to control intelligently the development of all aspects of the municipality.

Duties of
Planning
Boards

8. The planning board shall investigate and survey the physical, social and economic conditions in relation to the development of the planning area and perform such other duties of a planning nature as may be referred to it by the council, and without limiting the generality of the foregoing it shall,

- (a) prepare maps, drawings, texts, statistical information and all other material necessary for the study, explanation and solution of problems or matters affecting the development of the planning area;
- (b) hold public meetings and publish information for the purpose of obtaining the participation and co-operation of the inhabitants of the planning area in determining the solution of problems or matters affecting the development of the planning area;
- (c) consult with any local board having jurisdiction within the planning area;
- (d) prepare a plan of the planning area and recommend it to the council for adoption;
- (e) recommend from time to time to the council the implementation of any of the features of the official plan.
1946, c.71,s.7.

Plan to be
submitted
to council

9.-(1) The plan as finally prepared and recommended by the planning board shall be submitted to the council.

Adoption
of plan

(2) The council may adopt the plan by a vote of the majority of all the members. 1946,c.71,s.8.

Plan to be
submitted
to Minister

10.-(1) Upon adoption the plan shall be submitted by the council to the Minister who may refer the plan to any department of the public service of Ontario that may be concerned therewith and to the Hydro-Electric Power Commission of Ontario, and where the planning area consists of more than one municipality, the Minister shall refer the plan to the council of every municipality in the planning area, and if modifications appear desirable, settle such modifications as far as possible to the satisfaction of all concerned and cause the plan to be amended accordingly.

Approval by
Minister

(2) The Minister may then approve the plan, whereupon it shall be the official plan of the planning area. 1946, c.71,s.9.

In the absence of an Official Plan the municipality could prevent the hasty subdivision of their riverfront lands by passing a local by-law designating them as areas of subdivision control. This is in the nature of stop gap legislation designed to "hold the line" until official plans are formulated. Local municipal councils are empowered to take this course of action under Section 24 of The Planning Act:

Chap. 277

Areas of
subdivision
control

24.-(1) The council may by by-law designate any area within the municipality as an area of subdivision control and thereupon no person shall convey land in the area by way of a deed or transfer on any sale or enter into an agreement of sale and purchase or enter into any agreement that has the effect of granting the use of or right in the land directly or by entitlement to renewal for a period of 21 years or more,

- (a) unless the land is described in accordance with and is within a registered plan of subdivision, but the council may, in the by-law, designate land which although within a registered plan of subdivision shall be deemed not to be within a registered plan of subdivision for the purposes of this subsection;
- (b) unless the land is more than 10 acres in area;
- (c) unless the land is the whole part remaining to the person of one parcel described in registered conveyance to him; or
- (d) unless the consent of the planning board, if any, or where there is a subsidiary planning area, the planning board thereof, or the Minister, is given.

The local authorities control the land use in these areas by invoking Restricted Area or Zoning by-laws under

Section 390 of The Municipal Act:

390.-(1) By-laws may be passed by the councils of local municipalities:

Restricted Areas

Restricting use of land 1. For prohibiting the use of land, for or except for such purposes as may be set out in the by-law, within any defined area or areas or abutting on any defined highway or part of a highway. 1941,c.35,s.13 (1), part.

Restricting erection or use of buildings 2. For prohibiting the erection or use of buildings or structures for or except for such purposes as may be set out in the by-laws, within any defined use of area or areas or upon land abutting on any defined highway or part of a highway, 1941,c.35,s.13 (1), part; 1946,c.60,s.50 (1)

Uses for hazardous purposes. Rev. Stat., c.277 (3) Where an official plan is in effect in a municipality or a part thereof under The Planning Act, a by-law passed under this section may include a provision that no land, building or structure shall be used in the area covered by the by-law for such commercial or industrial purposes as are likely to create danger to health or danger from fire or explosion and as are specified in the by-law, without the approval in writing,

- (a) of the committee of adjustment constituted under section 15 of The Planning Act; or
- (b) where no such committee has been established, of the planning board,

and where a by-law includes such provision, the committee or board shall give one copy of its written decision upon any application for approval to the applicant and shall file one copy with the clerk of the municipality, and where the committee or board has refused to grant any such application it shall, upon the request of the applicant, refer the matter to the Municipal Board, which Board may grant or refuse such approval and its decision shall be final and binding. 1950,c.46,s.19 (1), part.

The standard of buildings and size of lots within the various parts of the township may be regulated by the local council through the passage of by-laws under Section 388 of The Municipal Act:

Chap. 243

388.-(1) By-laws may be passed by the councils of local municipalities:

Buildings

Size and strength of walls, etc., and production of plans

7. For regulating the size and strength of frame wooden, brick, stone, cement and concrete walls, and of the foundations and foundation walls, beams, joists, rafters, roofs and their supports of all buildings to be erected, altered or repaired, and for requiring the production of the plans of all buildings, and for charging fees for the inspection and approval of such plans, and fixing the amount of the fees and for the issuing of a permit certifying to such approval without which permit no building or structure may be erected, altered or repaired. R.S.O. 1937, c.266, s.407, par.4 and s.425, par.1, part 1946, c.60, s.55 (1), amended.

The economic importance of the cottage movement in the municipalities of the Grand Watershed is worth consideration. Cottage owners contribute to the tax structure of a municipality and very often spend considerable sums of money in the neighbouring towns during the summer season.

Sample studies were carried out in Dunn and Sherbrooke Townships to determine the assessed value of cottage developments in these areas. It was found that these municipalities receive over 20 per cent of their municipal taxes from cottage properties at the mouth of the Grand and the flanking lakefront.

The beneficial results of cottage development which are likely to accrue in the near future to rural municipalities further upstream are of such proportions that township authorities cannot afford to ignore the recreation resources of their area. They have a positive financial stake in the Grand River recreation program and should do all in their power to promote its satisfactory growth.

The cottagers assist immeasurably in meeting the costs of education and road maintenance in many townships. In the case of education, they contribute to a public service upon which they make no demands. The cost of road maintenance in the cottage areas of the Grand is not high, and in many cases the local residents receive direct benefits from improvements made primarily to meet the needs of cottagers.

CHAPTER 8

PICNIC TABLES AND TOURIST ACCOMMODATION

1. Picnic Tables

In the past few years there has been an increasing development of public parkettes and picnic table sites on the Grand Watershed by the Ontario Department of Highways and by Brant County.

The accompanying map illustrates the location of these throughout the valley. In total there are approximately 106* † picnic tables on 67 individual sites. About 59 of these sites, containing 98 tables, are operated by the Department of Highways. Brant County maintains 8 tables situated on 5 separate locations.

As indicated in the following summary, these facilities are scattered throughout all three major topographic regions of the watershed. However, the Central Hilly Belt has the greatest concentration.

PICNIC TABLES ON THE GRAND WATERSHED

	<u>No. of Sites</u>	<u>No. of Picnic Tables</u>
Flat Northern Plains	9	15
Central Hilly Belt	41	61
Plains of the Lower Grand	17	30
	<u>67</u>	<u>106</u>

These picnic sites are designed to accommodate motorists or holiday groups touring the countryside. They are intended for temporary stop-over. The average time spent

* These figures were obtained from field observations in 1952. The location and number of these tables may vary slightly from year to year, and the number of tables on any site may change with fluctuating seasonal demands.

† If picnic tables have a value of \$25 each, then about \$2,950 has hitherto been invested in this aspect of recreation.

ROADSIDE TABLES

-LEGEND-

- 2 DEPT. HIGHWAYS ROADSIDE TABLES
Refers to number of tables
- BRANT COUNTY ROADSIDE TABLES
- A PLAINS OF THE LOWER GRAND
- B CENTRAL HILLY BELT
- C FLAT NORTHERN PLAINS

SCALE 1 0 1 3 5 7 MILES



on an individual site rarely exceeds two hours and is often less than half of this. In the height of the vacation season, one table may be used by half a dozen or more groups in a single day.

In most cases the developments in the Grand Valley are extremely simple in appointment, and a minimum of landscaping and improvements has been carried out. Tables and trash containers have been set out at convenient locations along the highway. No fireplaces or toilet facilities are available. Drinking water is not usually provided on the site. Throughout the watershed the total area devoted to this recreational use does not exceed 25 acres.

There are a limited number of exceptions to the foregoing generalizations. The Department of Highways has an excellent development at the junction of Highways No. 2 and No. 24 about two miles west of St. George. Here seven tables have been placed in an acre or more at the highway intersection cut-off. This area has been sodded and beautifully landscaped with blue and white spruce, red cedar and maples. The trees and shrubs screen the picnickers from the passing traffic. A stone cairn, unveiled by Lady Tweedsmuir in 1937, has been erected to commemorate the birthplace of Adelaide Hunter-Hoodless, the founder of the Women's Institute. This site, however, does not provide fireplaces, water supply, or toilets.

The Highways Department has another notable development on Highway No. 3 at its junction with the eastern watershed boundary. Three picnic tables are situated under large shade trees and two sand pits have been built for the use of children.

These sites have been developed by the Highways Department and are maintained by employees in conjunction with their normal duties. Often little extra effort is entailed in putting out the tables each year and keeping the grounds

tidy. However, where considerable landscaping has been carried out and the grass is kept constantly mowed and tended, many more man-hours are required.

The picnic table developments of Brant County are worthy of special mention. This is the only county in the watershed which has undertaken to provide these much needed facilities. In some instances the standards it has achieved are remarkable. Its developments are located on county roads and constitute an important supplement to the Provincial Highway program. The tables are excellent, and the trash containers provided are superior to anything in use anywhere else in the valley. In no instance, however, do they provide fireplaces, toilets, or water. These table facilities are intensively used and greatly appreciated by motorists and the American visitors.

2. Tourist Accommodation

The provision of moderately priced but adequately appointed tourist accommodation is an important aspect of any recreation program. If satisfactory facilities are not available at reasonable rates, the majority of tourists will not remain long in a watershed, regardless of its scenic attractions.

There are approximately 85 hotels in the watershed and over 88 per cent of these offer accommodation to transient guests. Altogether, they have about 1,529* rental units with a total capacity of 3,132 guests. About 66 per cent of the rental units, with 65 per cent of the accommodation, are found in 26 hotels in the five incorporated cities of the watershed†.

* It should be remembered that these figures represent available transient accommodation. Some hotels have many more rooms than are represented in these totals, but they are rented to permanent guests. Some hotels such as Preston Springs are entirely residential. In many cases the hotels have reported only the number of rooms available to transient guests and not the total capacity. This has accordingly been estimated.

† Brantford, Guelph, Galt, Kitchener, Waterloo.



This useful roadside picnic site on the banks of the Lower Grand River beside Highway No. 54 is provided by the Ontario Department of Highways.

There was a total of 61 cabin and motel enterprises in the watershed in 1952. Their total capacity was just under a thousand (984) people. This accommodation was made up of 272 cabins, 16 rooms, and 140 motel units in 15 motels.

In addition to hotels and motels there are about ten establishments in the watershed which offer a total of 64 housekeeping units of accommodation with a capacity of 236 persons. These are located at some distance from the highway and are designed for longer stop-overs or for cottage rental. However, when vacant, they can be used by transient overnight guests.

Tourist homes have increased considerably in the Grand Valley in the past few years, and 29 such establishments, with approximately 124 guest rooms, were noted in the 1952 survey. These have a total guest capacity of about 260. Tourist homes in the larger urban centres were, in some cases, omitted from the survey, since it was too extensive a job to search the bigger cities for their location.

Tourist Accommodation in the Grand Valley

	Number of Units	Capacity
74 hotels	1,529	3,132
61 cabins and motels	430	984
29 tourist homes	129	259
	<u>2,088</u>	<u>4,375</u>

The majority of the hotels were built before 1920, and their distribution was governed by the road and rail patterns servicing market towns and industrial centres. Many of the smaller country hotels are playing an ever decreasing role in the provision of transient accommodation in the valley, as the newly developed highway network and transportation patterns of the area have left them in a disadvantageous position. By the sale of liquor under the provisions of The Liquor Control Act, some of them have experienced a return of prosperity. An

increase in the tourist business may be expected to improve still further their economic position. It is doubtful, however, whether many hotels, located in unattractive areas remote from the main flow of traffic, can ever expect to receive a large share of the tourist business. They were designed to provide accommodation to satisfy the social and economic requirements of a former age, and they are not likely to fit into the pattern of the tourist business which has sprung up in the last forty years.

Nevertheless, with the development of a well integrated recreation program within the Grand Watershed, some hotels could expect to receive an increased share of the provincial tourist business. At a later date it would be advisable to undertake a detailed study of all hotels on the watershed to determine their possible integration into the tourist business and into the recreation program of the valley.

The motels, cabins and tourist homes are a product of the automotive age and their location and distribution are accordingly almost completely tied to the provincial highway network of the area. They have been designed mainly to attract the transient overnight guest who will pass beyond the area the following day. The natural scenic beauty of the surrounding countryside is of little importance to such a guest when compared to ready accessibility to major traffic arteries and an attractive design and layout of buildings and surrounding grounds.

There is no doubt that these establishments, which have all been constructed in the last 30 years and are advantageously located with reference to the main traffic arteries, have made a considerable inroad into the hotel room business or at least receive a high proportion of the increasing tourist traffic of recent years. At present they have only one-third the rental capacity of existing hotels in the watershed, but

their number and capacity are rapidly increasing with each passing season.

The tourist homes can offer effective competition to many motel and cabin operators. Their rates are usually somewhat lower too and many offer excellent accommodation in a comfortable home atmosphere. The tourist home is likely to occupy about the same relative position in the accommodation arrangements of the Grand Valley for some time to come and the number of such homes will undoubtedly increase.

CHAPTER 9

MULTI-PURPOSE PARKLANDS

1. Elora Gorge Park

(a) Description of the Property

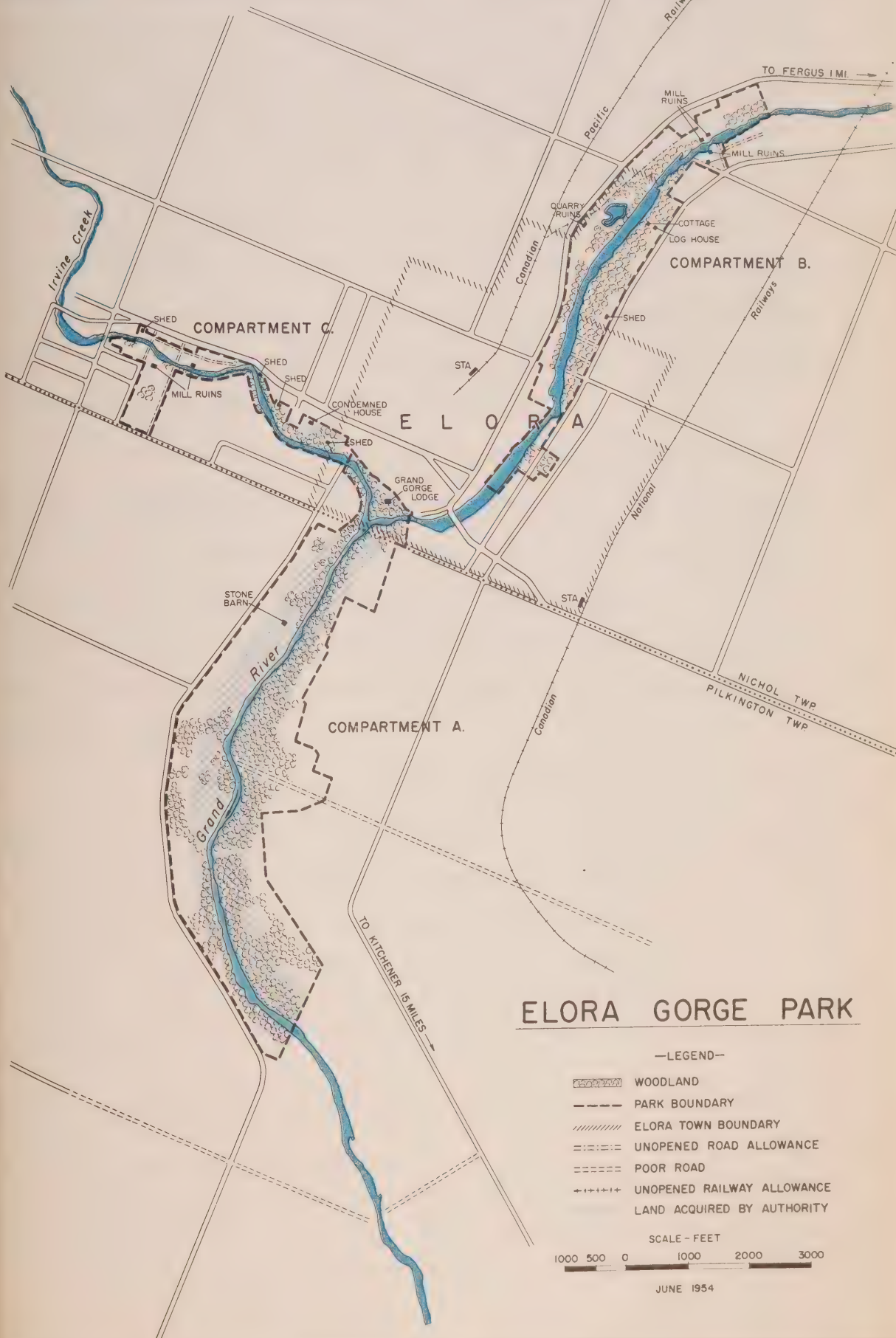
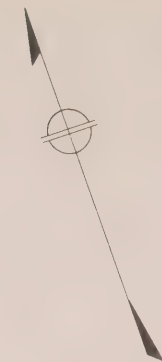
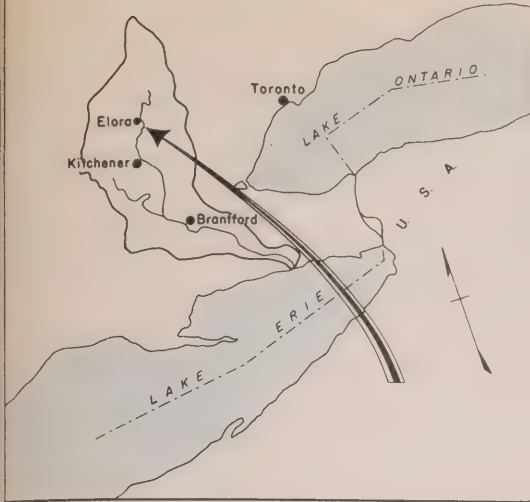
The Gorge of the Grand River at Elora is a unique scenic attraction which cannot be duplicated in Southern Ontario and is only surpassed in grandeur by the mighty Niagara chasm. Upstream from Elora the Grand River flows in a curved course between cedar-covered limestone banks which vary from six to fifteen feet in height. The broad sheet of somewhat slower moving water and the more subdued topography of the area stand in sharp contrast to the fierce and foreboding downstream reaches.

At Elora the historic and picturesque Grand River tumbles over fifty-foot falls and winds its way for a tortuous mile and a half between sheer walls of limestone towering seventy-five to one hundred feet above the bed of the stream. This is the most spectacular stretch of the Grand River and the unique beauty of the Gorge is an outstanding scenic attraction which is capable of continually drawing tourists from a very wide area.

The scenery of Irvine Creek approximates that of the main Gorge at its point of junction with the Grand River. Further upstream the valley walls decrease in height but the rugged limestone character of the area is never lost within the confines of the proposed park.

The scenic qualities of the area will make this park an outstanding attraction at the northern end of the scenic drive up the Grand River and are of sufficient merit to induce travellers to break their northward journey, providing satisfactory hotel or trailer camp accommodation is made available.

In addition to the rugged, rocky sections of the park there is a sufficient proportion of relatively level land



available for the development of playing fields and other facilities. Fairly large areas of flat land are available in both Compartments A and B of the park.

The area is well endowed with a variety of aquatic resources which are suitable for enjoyment by all age groups when satisfactorily developed and improved. Excellent swimming is available in the quarry which has a 2.5-acre water surface surrounded by 65-foot sheer rock walls. The water is clean, clear and deep and has reacted well to periodic tests by the health authorities at all seasons. "Birch Hole", a 100-yard stretch of the Grand River in the lower end of Compartment A of the park, can be developed into an excellent swimming facility. This stretch of the river would be wide, deep and long enough to satisfy the requirements of a standard artificial swimming pool in any urban centre in the Province, with very little improvement.

The section of the Grand River which flows through Compartment B of the park offers some excellent possibilities for boating and canoeing. Here the river is sufficiently wide and deep for these activities, due to the dam of Elora Industries. The many intriguing indentations in the cedar-covered limestone banks lend additional beauty and variety to the area.

The low natural agricultural capability of the land, coupled with its present land use pattern as illustrated in the following table, favour park development.

PRESENT LAND USE PATTERN

	Acres	Per Cent of Area
Cultivated	43.0	10.7
Woodland	207.7	51.8
Undeveloped	150.4	37.5
Total	401.1	100.0

The area is largely bouldery, uncultivated land which has been invaded by noxious weeds and overrun with hawthorn bushes up to fifteen feet in height. The majority of the woodland cover is cedar. Hardwoods of low commercial value, but ideally suited to recreation purposes, are scattered throughout the park.

The conversion of the area into parkland would undoubtedly increase the economic and social returns from the land. Practically no disruption of agricultural practices on the surrounding farmlands would ensue. The high and precipitous cliffs along the gorge preclude the use of most of the riverfront for stock watering purposes. Very few acres are now cultivated and the loss of any pasture derived from the scrubland can be easily offset by the improvement of alternative grasslands.

(b) Accessibility

The village of Elora is well situated with respect to population concentrations on the Grand Watershed and easy access is possible over good roads. Approximately 150,000 people reside within a twenty-mile radius of the Grand Gorge. Guelph, with a population of 27,386 within its incorporated limits, is only fourteen miles distant. The Kitchener-Waterloo conurbation, with over 60,000 population, is approximately eighteen miles from Elora by well-graded gravel roads and twenty-two miles via paved Highways No. 7 and No. 6.

The metropolitan concentrations of Toronto and Hamilton are within comparatively easy reach of the area. Toronto is approximately seventy-five miles away and Hamilton about forty-two.

Elora is served by C.N.R. and C.P.R. railway connections. A regular bus service is available to Guelph. If the need arose these facilities could be extended and improved to serve a large body of people who do not possess automobiles. Special excursion rates and schedules could be arranged during the summer months.



The magnificent limestone cliffs of the Grand River Gorge at Lookout Point.



Picturesque rapids and gravel bars at the foot of the old rocks.



A holiday crowd "exploring" Irvine Creek at its junction with the Grand River Gorge.

The public has already been attracted to this area for recreation purposes. Between 400 and 500 cars arrive at the Gorge in Elora almost every fine Sunday during the summer. Club and factory picnics are not uncommon. At least 40,000 people visit the Grand Valley Gorge during the summer season.

(c) Proposed Development

The proposed park area has been divided into three separate compartments. Compartment A, containing 281.9 acres and lying downstream from Elora, includes the most spectacular scenic attractions of the park. Compartment B, 84.5 acres in extent, lies upstream from Elora. Compartment C, with an area of only 34.7 acres, is situated along the banks of the picturesque Irvine Creek for a short distance above its junction with the Grand River.

This park should be developed as a multi-purpose parkland where there will be sufficient facilities for the enjoyment of a wide variety of recreation activities.

The banks of the Grand River and Irvine Creek abound in first-class picnic sites of sufficient variety to satisfy a wide range of tastes. There are excellent locations close to the level of the water and many beautiful high and dry positions well back from the river.

In some cases picnic tables should be set out singly in isolated locations to meet the requirements of the small family picnickers. In other places a number of tables could be grouped about a central picnic area which is provided with fireplaces for outdoor cooking.

A central pavilion which is equipped with a kitchen and hot water facilities will be required. This will satisfy the requirements of the large institutional picnics and provide shelter in wet weather.

Many beautiful walks and trails can be developed along the numerous ledges of the limestone walls of the valley



Photograph Courtesy The Farmers Advocate.

This rustic pavilion erected by the Authority measures 100 feet by 40 feet and contains a kitchen and toilet facilities. It is designed to handle large club and industrial picnics, particularly in inclement weather. Construction was completed in time for the official opening of the Elora Gorge Park on Saturday, July 24, 1954, and it has already catered to the requirements of many thousands of visitors.

and excellent lookout points can be built by simply clearing away the scrubby undergrowth and accumulated rubble. Compartment A of the park could become a hiker's paradise with few, if any, rivals in Southern Ontario.

It will be necessary to establish one or more sportsfields in the park which are of sufficient size to satisfy the regulation requirements of a number of sports. Baseball diamonds, tennis courts, football fields are all possible developments.

Swimming will be confined in the main to the quarry in Compartment B of the park and "Birch Hole" in Compartment A. Both these sites are now used for bathing and the quarry is an exceptionally popular area.

The quarry is undoubtedly one of the finest natural swimming pools in South-western Ontario and will be one of the great assets of the park when properly developed and improved. At present access into the heart of the quarry is only possible over the waste dump from the former operations. This can be graded down to give an easier approach to the water and it should be a relatively simple operation to fill in the west section of the quarry for the use of children and non-swimmers. The whole area will require a general clean-up and some landscaping. A central bath house will also be necessary.

"Birch Hole" will constitute a second swimming area within the park. This resource will increase in value as the pollution problem of the Grand River is overcome. Some accommodation for changing will also be required here.

In addition to the facilities for picnicking, hiking, swimming and field sports, it will be necessary to install a number of other improvements. Roads, parking lots, and entrance gates will be required. Water supply, toilets and electricity must be made available. Refreshment concessions, which may be owned and operated by the Authority or leased, are essential.

Since this park is sufficiently attractive to induce many people to spend more than a single day in the area, it would be advisable to make provision for the establishment of a trailer camp or motel. Several sections of the park would make a satisfactory site for this type of development. The south bank of the Grand River in Compartment B of the park would appear to be particularly suitable for such establishments.

On March 26, 1953, a report on this proposed parkland was presented to the meeting of the Grand Valley Conservation Authority by the Advisory Board on Recreation and received approval. The 281.9 acres of Compartment A of the park are now owned by the Authority. Fireplaces and picnic table sites have been erected. A light summer road has been constructed through the area and several thousand feet of trails have been opened along the banks of the river.

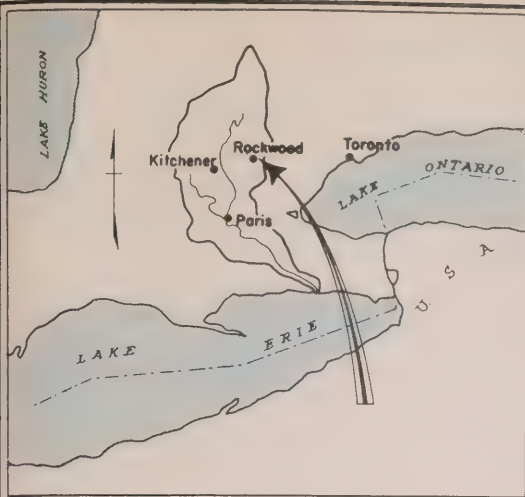
At the meeting of the Grand Valley Conservation Authority on February 5, 1954, it was decided that a further acquisition of land be carried out according to the initial plan and that the development of the area be continued, including the building of a pavilion 50 feet by 100 feet.

2. Rockwood Park

(a) Description of the Property

This proposed 432-acre park, which is situated on a tract of land in and about the village of Rockwood, compares favourably with other possible recreation lands in South-western Ontario. The natural features of the area combine to produce one of the most scenic landscapes encountered along the entire length of Highway No. 7 from Sarnia to Perth. A series of small interconnected ponds enclosed in sheer rock walls of white limestone, up to 100 feet in height and surrounded by dense conifer woodland intermingled with scattered hardwoods, provide a setting of exceptional beauty. The particular blending of water, forest, and rock produces a wilderness effect which in many respects bears a close affinity to the remote areas of Northern Ontario.

In this area the limestone bedrock is exposed at the surface, or is overlaid by a very thin veneer of bouldery soil. As a result, the topographic features, which vary from



moderately rough to extremely broken, impart a rugged appearance to the landscape that is ideally suited to parkland development.

The well developed potholes which are frequently encountered in the area are an outstanding physiographic feature and deserve special mention. The two very large and extremely well defined potholes in High-Pot Low-Pot Park, perhaps the finest examples of this type of development in all Southern Ontario, are worthy of preservation as geological monuments.

Although the area is characterized by a very irregular surface, there is sufficient flat land available for the establishment of playing fields. This can be readily enlarged if necessary.

There are approximately 20 acres of water surface in the series of interconnected ponds and streams in Compartment A of the park and canoeing, boating and fishing are all possible on these waters. However, the limited size of these ponds will restrict the number of craft which can be conveniently allowed on the water at one time. As streams on either side of the ponds quickly become shallow, boating beyond the confines of the park is not possible. Hence a boat rental service, while it would provide an additional attraction for the park, is definitely limited in scope.

Good swimming holes are available at the eastern and western extremities of the park. Both of these are extensively used by swimmers at the present time.

Approximately 62 per cent of the total area of the proposed parkland is wooded. White cedar, comprising over 85 per cent of the woodland, is the dominant cover type. While large areas of pure white cedar are present over much of the forested land, in many places a sufficient number and variety of hardwoods are present to relieve the monotony. In some sections, white pine and trembling aspen are the dominant species.

Considerable reforestation has been carried out on the rougher sections in the middle of Compartment B of the park and young plantations now cover about 15 acres.

A high percentage of cedar in the area is stunted and poorly formed. This is no doubt due to poor soil conditions and long periods of summer drought. Although a large area of the forest cover leaves much to be desired with respect to timber production, it is quite satisfactory for recreation purposes. Considered as a whole, it may be said that the present state of the woodland cover of the area is satisfactory for park development. Judicial maintenance, improvement and reforestation could bring it to a high degree of perfection in the ensuing years.

The magnificent display of colour encountered in here each autumn is worthy of special mention. The brilliant orange, red and yellow hues of the deciduous trees framed against a background of sharply contrasting green cedar and white limestone provide a landscape of exceptional beauty.

This development will cause a minimum of interference with existing land use patterns in the area. The present land use conditions in the major segments of the park are presented in the following table.

PRESENT LAND USE IN ACRES

Compartment	Woodland	Pasture & Cultivated	Unimproved Land	Water	Total
A	170	10	65	20	265
B	97*	29	41	--	167
Total	267	39	106	20	432

* Fifteen acres of this total is a young forest plantation a few inches in height.

Due to the extremely shallow and bouldery nature of the soil, over 90 per cent of the land is unsuitable for agriculture. At the present time only 39 acres or approximately 9 per cent of the area is in cultivation or rotation pasture. About 106 acres is now lying idle.

In the extreme north-east corner of the proposed parkland in Compartment B, there is a small frame barn resting on a stone foundation. This building could be used for storage purposes.

It should be noted that although this proposed parkland **abuts** immediately against the western margin of the village of Rockwood and prevents further expansion in this direction, there is ample open land to the north-east and south-east for the future expansion of the village.

Although some housing and industrial development has occurred on areas lying within the proposed parkland, it should not cause any insurmountable problems.

The old woollen mill, the property of Mr. Harris of Rockwood, has not operated for many years. This building, which appears to be in fair condition from the outside, might be remodelled and used for recreation purposes.

Three dams, the locations of which are shown on the accompanying map, will have to be kept in a state of good repair, since the level of water in the ponds is dependent upon these installations. Although the purpose for which they were originally constructed was industrial, they will now serve a vital function in the recreation program.

The old mill immediately to the west of the road between Concessions III and IV of Eramosa Township, in Compartment A of the park, is now in a state of ruin. It would be advisable to raze this, to avoid the possibility of accident due to the collapse of the structure.

The current popularity of an area is often a good guide to the need for a park development in a particular region and an indication of the success that can be expected for such an enterprise. The Rockwood area has held a long and continuous attraction for swimmers and picnickers from the surrounding district and in recent years, with improved road



The picturesque ponds of Rockwood as seen from Lookout Point.



The broad expanse of water in the large pond at the western extremity of the proposed park is suitable for swimming, fishing and boating.

communications, for the residents of cities as far distant as Toronto. Almost every warm summer day a large number of children use the ponds of the area for swimming. On hot evenings and week-ends crowds flock to the area by automobile from such places as Guelph, Hamilton and Toronto.

(b) Accessibility

The central location of this proposed parkland is one of its outstanding assets. Within a thirty-mile radius of the area, which includes a part of the outskirts of the Toronto region and greater Hamilton, approximately 1,755,000 people reside. This represents about 39 per cent of the total population of all Ontario or 43 per cent of the population of Southern Ontario.*

Several cities are situated within a short motoring distance of the park. A large part of Metropolitan Toronto is about 50 miles distant by provincial highway. Hamilton is approximately 35 miles away, Kitchener 30 miles and Guelph 7 miles.

One of the major east-west traffic arteries of Southern Ontario, namely Provincial Highway No. 7, passes through the centre of the park and provides easy access to the heart of the development. Such a desirable location as this will undoubtedly assure the park of widespread publicity and a high average daily attendance during the peak of the tourist season.

The main bus route from Toronto to Guelph follows Highway No. 7 and hence leads directly through the park. It should be a relatively simple matter to inaugurate special holiday excursions to the area from densely populated areas of Metropolitan Toronto, where recreation space is at a premium and the demand for facilities heavy.

* In this instance Southern Ontario is taken to include the counties of the province.

The Canadian National Railway line from Toronto to Guelph passes through Rockwood. The railway station at Rockwood is only a five-minute walk from the centre of the proposed parkland. If a convenient service were established along this line, considerable passenger traffic could be carried by rail during holiday week-ends.

(c) Proposed Development

This area, 432 acres in extent, should be developed and maintained as a multi-purpose parkland primarily designed to provide a wide variety of recreation facilities for the people of the surrounding region. While the area is basically intended for the use of local residents, its strategic location on Provincial Highway No. 7 will undoubtedly attract many tourists during the summer season.

The park area has been divided into two separate compartments which vary considerably in natural characteristics and will hence require somewhat different handling. Compartment A, which possesses all the aquatic resources of the parkland and is in effect the core of the development, is approximately 265 acres in extent. Compartment B, which is without water resources and is composed largely of broken bouldery reforestation land, is about 167 acres in area.

Two desirable extensions to the main body of the park have been suggested for acquisition in the future. To the west approximately 91 acres of land, on either side of the Eramosa River, is highly desirable recreation property. To the north-east, approximately 31 acres of cedar bush flanking the Eramosa River and extending from the highway to the C.N.R. bridge should be incorporated into the park in the future.

Compartment A is of sufficient size and a satisfactory natural character to permit of the installation of a wide variety of recreation facilities. Excellent hiking and nature trails can be laid out along both banks of the river.

There is ample room for a pavilion and sportsfield to accommodate large picnics. A number of picnic tables and fireplaces can be installed in remote and picturesque locations throughout the area.

Compartment B, situated on the north side of the highway, would require a somewhat different treatment. There is no water here for swimming or fishing and the forest cover is of limited value for recreation purposes. However, this area is required to give the park spacious surroundings and to provide for the increasing population of the region. About 15 acres of rough bouldery land in this compartment has already been reforested. Most of the remaining open area would require immediate planting. Until these reforested areas have reached sufficient size to provide shade, this compartment will be of limited recreation value. However, when covered with coniferous forest it will constitute a valuable addition to Compartment A of the park.

Recognition should be given to the role played by members of the Harris family in the conservation of many of the desirable features of this area, which now render it so suitable for park development.

A very high proportion of this proposed park is now owned by Mr. W. and Mr. E. Harris. Over a period of years they have successfully consolidated various scattered parcels of land into a continuous block under single ownership.

While a section of their holdings was used for the site of the woollen mill and several houses, large tracts of the area have been intentionally preserved in all their natural beauty, so that today the area stands out as one of the most scenic locations in the entire region. A considerable amount of reforestation has been carried out on these lands.

The public has never been completely excluded from all parts of this area. People have been permitted to use the pond for swimming and for some time High-Pot Low-Pot Park was open to the public at reasonable entrance charges.

If this consolidation of holdings had not been progressively carried out by the Harris family, there is no doubt that this beautiful recreation property would long ago have been carved into a multiplicity of small cottage sites, or locked up as the central core of a private estate or club from which the general public were rigidly excluded. If the area had been split between a host of cottage owners, the possibility of developing it into a public park would have been exceedingly difficult, if not almost impossible.

3. Doon Park

(a) Description of the Property

This proposed park is an 861-acre tract of land in the vicinity of the village of Doon, part of which is already in public ownership.

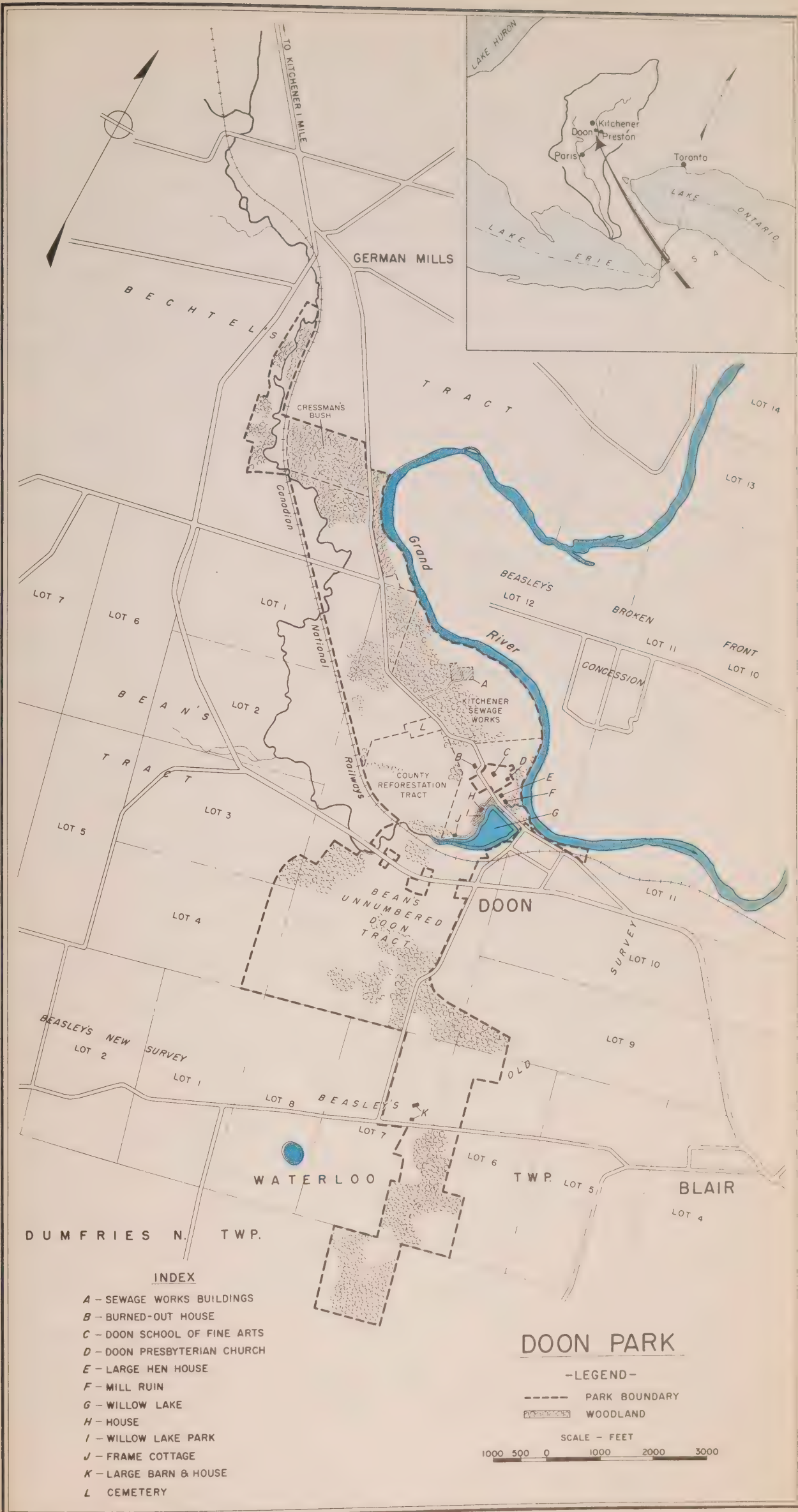
The establishment of the park will necessitate the purchase of about 649 acres of private property and the integration of approximately 212 acres of publicly owned land into the scheme.

The particular combination of topography, water, trees and man-made features of this locality make the area one of the outstanding beauty spots in the entire rural landscape of Southern Ontario. The picturesque qualities of the district are known throughout the Province and have largely influenced the decision to establish the School of Fine Arts at Doon.

The topography of the area renders the land suitable for a wide variety of recreation activities. The irregular rolling to rough surface features which characterize the Central Hilly Belt are faithfully repeated in this locality, although with somewhat more softly rounded contours and considerably less boulderiness. The north and east boundary of the park is flanked by the deeply entrenched valley of the Grand River, and some extraordinarily fine scenery can be viewed from atop these high-cut banks.

The remainder of the park area stretching from the valley shoulder to the south and west is composed of a series of hills and broad valleys. Here there would be ample flat land for the development of playing fields. The larger hills in the southern section of the park are over 300 feet in height in some places and highly suitable for skiing and sleighing.

The area is reasonably endowed with aquatic resources, but a considerable improvement of stream conditions is desirable. The polluted condition of the Grand River is a serious handicap.



Willow Lake, which is actually a 9-acre mill pond, is a resource of considerable value. At present this pond is operated as a swimming pool by the owner. The small stream which skirts the north-west section of the park in the vicinity of Cressman's Bush is not deep enough for swimming or boating. However, its scenic and recreation values, which are considerable, could be improved at very little expense.

Approximately 349.0 acres, or 40 per cent of the total area, is now in forest consisting of hardwoods, with a scattering of white pines on the uplands. However, large sections have been reforested with coniferous plantations.

Several fine hardwood stands remain. The 60 acres of woodland known locally as Cressman's Bush, which is now partially owned by the City of Kitchener, is a superb recreation resource. The remaining 185 acres of hardwood bush are scattered throughout the park area, but in several distinct concentrations. The woodlot crowning the high hills of the southern part of the park is a particularly valuable asset from the recreation standpoint.

The coniferous plantations, which total about 105 acres, vary greatly in age. The trees planted on the lands associated with the Kitchener sewage plant have now reached sufficient size to be useful for recreation purposes. The 80-acre County Forest immediately to the south has been planted recently.

(b) Accessibility

The central location of this area makes it very suitable for a regional park. About 300,000 people are living within a 25-mile radius of the site and all the cities of the Grand Valley fall well within this distance. The outskirts of the Kitchener-Waterloo conurbation are only six miles distant. Brantford is about twenty miles away and Guelph slightly less. In effect, well over 90 per cent of the urban population of the

Grand Valley, and about 80 per cent of the entire population of the watershed, lie within this 25-mile radius of the proposed park.

The road network converging on the area is excellent and most of the surfaces are paved. In addition, it should be noted that the proposed park lies in close proximity to the new projected highway between Toronto and Windsor.

(c) Proposed Development

It is intended that this park should be operated as a regional multi-purpose recreation area similar to the proposed developments at Elora and Rockwood. Swimming, hiking, picnicking and camping could all be included. During the winter months, the steep slopes at the southern end of the park could be developed for skiing and sleighing.

The unique beauties of the area are now in serious jeopardy and hence the need to set this land aside for public parkland is urgent. The presence of such a scenic area within such a short distance of Kitchener and Waterloo is attracting the attention of those interested in the development of suburban homes. The recent subdivisions along the county road, which runs through the proposed park area, are a clear indication that the advance guard of the movement has already reached this locality.

About 212 acres, or almost 25 per cent of the proposed park, is now owned by public authorities and devoted to a variety of uses. If a combined form of land use is instituted in these areas, it should be possible to make their recreation value available to the public without seriously interfering with the present developments.

A section of this park area includes a 42-acre woodland known as Cressman's Bush. Some years ago this property was acquired by the City of Kitchener for development as recreation land. As the area is now devoted to parkland uses,



The superb scenery viewed from atop the west bank of the Grand River in the proposed Doon Park, is some of the finest in the valley.



The pond and beach at Willow Lake Park would be incorporated in this park development.



The splendid woods of Homer Watson Park, which is owned and operated by the City of Kitchener, would be integrated in the proposed Doon Park.

there is no difficulty in integrating it with the proposed project regardless of whether a transfer of ownership is carried out or not.

The Kitchener sewage works covers about 90 acres of land included in this scheme. It should be possible to open a large part of this area to various forms of recreation use, without any serious interference with the operation of the sewage plant.

This sewage works property includes a section of the steep southern valley slope of the Grand River and a portion of the valley flats. The slopes, approximately 50 per cent of the property, are densely wooded, due to the establishment of coniferous plantations in open areas between the natural hardwood stands. This area is highly suitable for the establishment of a walking trail and occasional picnic sites, and hence could perform a useful function in the overall recreation development. At the present time this area simply forms an approach to the sewage works and screens the installations from public view.

The sewage plant in the valley floor will not completely destroy all recreation potential in the surrounding area. In actual fact it has an interest for many people, which could be exploited to the full when the grounds adjacent to it are grassed and landscaped. In some cities where open spaces are at a premium, the well-kept lawns surrounding sewage and water works are utilized to the fullest extent for public recreation purposes.

Approximately 80 acres of land included in the park are now being developed as a County Forest. This means that it is closed to the public at present, but the use to which the land is being devoted should enhance the natural beauty and recreation potential of the district. Since the area is publicly owned it might be integrated with the park some time in the future.

SPOTTISWOOD LAKE PARK AND PINEHURST LAKE PARK

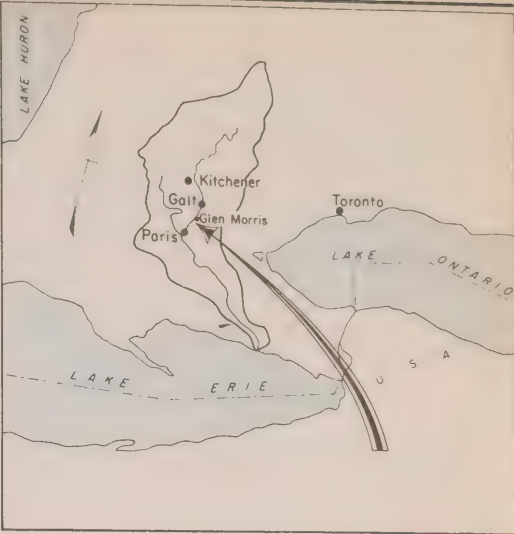
-LEGEND-

- PARK BOUNDARY
- WOODLAND
- MARSH
- LAND ACQUIRED BY AUTHORITY

SCALE - FEET

1000 500 0 1000 2000 3000

JUNE 1954



The remainder of the land is privately owned and must be purchased. The commercial park and swimming facilities now in operation at the old mill pond at Doon, which is called Willow Lake, are among this group of private holdings. Here the owner has developed a beach along the north-west side of the pond and several small cottages are offered for rental during the summer season.

4. Spottiswood and Pinehurst Lakes

(a) Description of the Property

This area of 1,437 acres is located in the Central Hilly Belt of the Grand Watershed in the vicinity of Spottiswood and Pinehurst Lakes. As will be more fully explained later, this program envisages the development of the area as a combined Conservation Authority Parkland and Forest. These two aspects of land use can be satisfactorily combined within this 1,437-acre tract without any serious conflict of interests and with mutual benefit to both.

The particular combination of topographic features encountered here is ideally suited to parkland development. A bouldery and hummocky range of linear hills, which swings in an east-west direction across this section of the watershed, forms the major topographical component of the parkland. The Grand River has carved a deep and steep-sided valley through the belt of hills. The rolling to rough configuration of the land presents pleasing variation for the eye and permits of a wide variety of recreation activity.

High and dry land is available for picnic and camp sites. Attractive vistas can be obtained from a number of the more elevated points. Skiing and tobogganning are possible on the steeper slopes. The two small lakes situated in hollows between the hills are useful for swimming, boating and fishing.

Approximately 600 acres or 41.9 per cent of the proposed parkland is now forest-covered and most of the woodland

is highly satisfactory for recreation requirements. Hardwood species dominate the upland areas with the large continuous stands of conifers being confined to the main Grand Valley.

Splendid woodland cover is encountered in the area between and surrounding Pinehurst and Spottiswood Lakes. A considerable variety of hardwoods such as oak, elm, hickory, ash, silver maple, aspen and hard maple are present. Some sassafras was also noted in the area. A few groups of white pine are also found in certain sections. There are some dense stands of conifers along the margins of the Grand River, but in the main, hardwood species also dominate the composition of this steep-sided valley.

About 10 per cent of the woodland is composed of fairly large trees 10 to 18 inches in diameter. About 85 per cent of the bush is made up of smaller trees varying from 4 to 10 inches in diameter.

This area is fortunately endowed with a variety of aquatic resources which enhance the scenic qualities of the landscape and widen the range of potential recreation activity.

The two Spottiswood Lakes, which are situated on the former Hipel Estate, have a combined area of 34 acres. The larger of these lakes, approximately 27 acres in extent, is now partially filled with sediment. The smaller of these two lakes is deep, warm and clean enough for swimming and at the present time provides some excellent fishing.

Pinehurst Lake, located beside Highway No. 24A, is about 18 acres in area. This lake is also satisfactory for swimming and fishing.

The remaining ponds of the area are considerably smaller in extent and have a limited recreation use. Their main value lies in their scenic quality.

At this part the Grand River is too shallow and too polluted to be used for swimming or boating. Here again the main value of the water resource is associated with the

beautification of the natural features of the area. Once the pollution is overcome, this resource may be exploited for various forms of recreation.

The current land use pattern within the area proposed for park development is indicated in the following table.

Present Land Use in the Park Area

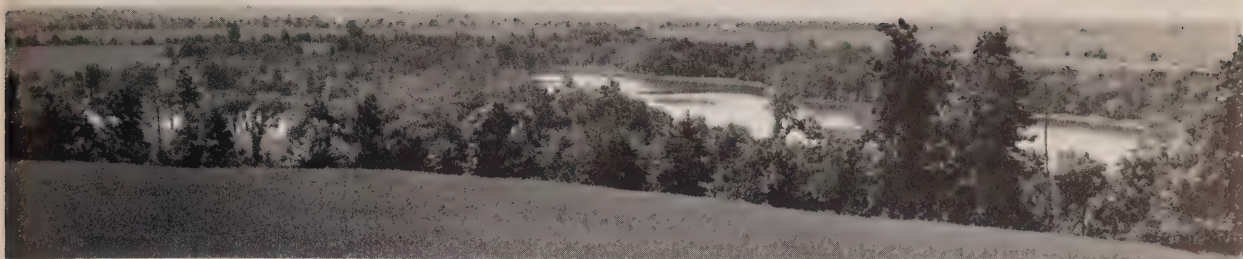
<u>Use</u>	<u>Acreage</u>
Woodland	601
Pasture	680
Cultivated	83
Water	73
	<hr/>
	1,437

Only 83 acres or 5.7 per cent of the total park area consists of land which is regularly cultivated for purposes of crop or hay production. Approximately 680 acres, or 47.3 per cent of the total area of the parkland, has been classed as pasture land. It should be noted that 50 per cent of this area is associated with bouldery and hummocky land of low pasture value, or with swampy hollows between the hills. However, some of this pasture land is of a fairly high order.

Generally speaking, this parkland development will not remove much high-class land from agricultural production but some good pasture land will be taken.

(b) Accessibility

The central location of this proposed parkland with reference to the major population concentrations of the Middle Grand River area, is one of the outstanding features of the development. This is a truly regional park for the people of the central part of the Grand Valley. Within a twenty-mile radius, which encompasses an area almost entirely within the confines of the Grand Watershed, approximately 238,600 reside. In effect, 80 per cent of the entire population of the Grand Valley lives within this area. All five cities of the Grand Valley are within a short distance of the



*A view of Spottiswood Lake
from a high hill within the pro-
posed parkland.*



*Pinehurst Lake adjacent to High-
way No. 24A is a valuable asset
of the parkland.*

*Much of the rough, hilly land
in the interior of the park area
will require reforestation.*



park and access is possible over paved highways. Guelph is 22 miles distant, Kitchener 18, Waterloo 20, Galt 7 and Brantford 19 miles.

It should be convenient and economical to establish regular bus services to this area from all the above cities. At the present time several scheduled bus routes pass close by.

In addition, it will be noted that the Lake Erie and Northern Railroad passes through part of this park. This line, which connects with the Grand River Railway at Galt, provides an alternative and convenient means of transport to the park for Kitchener, Waterloo, Preston, Galt and Brantford. These cities have a combined population of approximately 110,000.

Recreation areas are urgently required in this central and heavily populated section of the watershed. Suburban development is rapidly pushing up and down the main Grand Valley from the older established cores of Brantford, Paris and Galt. Within a short time it is likely that this highly desirable recreation resource will be subdivided for private homes.

(c) Proposed Development

As previously indicated, it is proposed to develop this 1,437 acres of land as a combined multi-purpose parkland and Grand Valley Conservation Authority Forest, as indicated on the accompanying map.

In the initial stage of the development two separate areas, comprising 325 acres, will be immediately reserved for parkland purposes. These two areas should be joined together by a public footpath leading through the splendidly wooded lands lying immediately adjacent to them. In addition, provision should be made for public access along the entire length of river frontage associated with the development.

The remaining area, approximately 1,100 acres in extent, will be developed and maintained primarily as an

Authority Forest until such time as the demand for increased recreation space warrants its use for this purpose. In the interval, the land may be producing a crop of trees which will yield some economic returns to the Authority.

The 325 acres of recreation land is contained in two separate parcels which are grouped about the larger ponds of the area. The first of these, containing approximately 144 acres, lies adjacent to Highway No. 24A and surrounds an 18-acre pond known as Pinehurst Lake. The second, embracing 181 acres, surrounds the Spottiswood Lakes and extends along the Grand River for some distance.

When these areas are completely developed, they should contain the full range of recreation facilities anticipated for the other regional parks such as those at Rockwood and Elora.

Good fishing can be provided in the smaller of the two Spottiswood Lakes and in Pinehurst Lake. In the latter case, some boat rental facilities could be made available to the general public. Swimming is possible in both of these lakes and especially in the smaller of the Spottiswood Lakes.

The larger of the Spottiswood Lakes is, as was previously mentioned, filled with sediment to within a few feet of the surface. Beneath these sediments there is a marl deposit of unknown depth. It would be desirable to deepen this lake to improve its recreation potential. This could be easily carried out and the cost could be reduced to a minimum if the material excavated could be sold to people in the neighbouring urban centres for loam dressing and fill.

The size of this forest parkland renders the area ideally suited for the establishment of nature and hiking trails. Since a continuous route of at least 10 miles in length can be set up within the park, riding would be feasible.

The possibility of utilizing these parks in the winter months, the Spottiswood Lake segment in particular,

should not be overlooked. Such a procedure would fulfil certain recreation requirements of the people of the area, and also decrease operating costs for the Authority by securing the maximum use of the area throughout the year.

In the park area surrounding the Spottiswood Lakes, there are steep hills which are suitable for skiing and tobogganning. Admittedly these hills are not long and steep enough to satisfy the requirements of expert ski enthusiasts, but they are of sufficient proportions to provide a great deal of pleasure to beginners. A good toboggan slide could be laid out within the park.

The small pond which freezes over in the cold winter months would make an excellent outdoor rink. If lights were laid out around the edges of the pond and music provided, this natural rink would undoubtedly attract many skating parties from the surrounding urban areas.

The park is large enough to be suitable for sleighride parties. A circular tour, about six miles in length, could be laid out through some of the most attractive landscape in the Grand Watershed.

Over 1,100 acres would be set aside for management as an Authority Forest. A large percentage of this area is now in forest and contains trees of moderate size. Approximately 40 per cent of this section of the development is now open land and suitable for planting. It should also be noted that the development of large Conservation Authority Forests immediately adjacent to recreation lands will provide considerable publicity for this aspect of conservation.

As indicated on the accompanying map, the Grand Valley Conservation Authority has already purchased about 40 acres of property surrounding and including Pinehurst Lake.

5. Byng Island Park

(a) The Description of the Property

This proposed park consists of Byng Islands, an area of 56 acres in the Lower Grand River opposite Dunnville, now owned by the Department of Transport, Government of Canada.

The parkland is composed of two separate islands which are joined by a small dam and causeway. The larger of the two has an area of about 46 acres, while the smaller is 10 acres. The northern island is linked to the mainland by a dam and causeway while the smaller southern island is connected with the main highway by a similar construction.

The whole of the area is relatively flat, having been built up from sediment of the Grand River and Sulphur Creek. Small sections of these islands are still inundated during periods of very high water, but this should not prevent the use of the area for recreation purposes during most of the year. The level topography is suitable for picnic sites and playing fields without the necessity of expensive improvements.

Approximately 33 acres, or 58 per cent of the total area of the islands, is tree-covered. All but about 5 acres of this woodland is situated on the larger and more northerly island. The trees are mostly hardwoods, including hickory and oak. There are a number of beautiful willows along the southern edge of the island opposite the main highway.

The eastern side of both islands is fringed with a broad expanse of rushes reaching for varying distances into the main Grand River. These areas, while of little recreational value apart from their effect on fish life, give a peculiar charm which is seldom duplicated on other parkland areas.

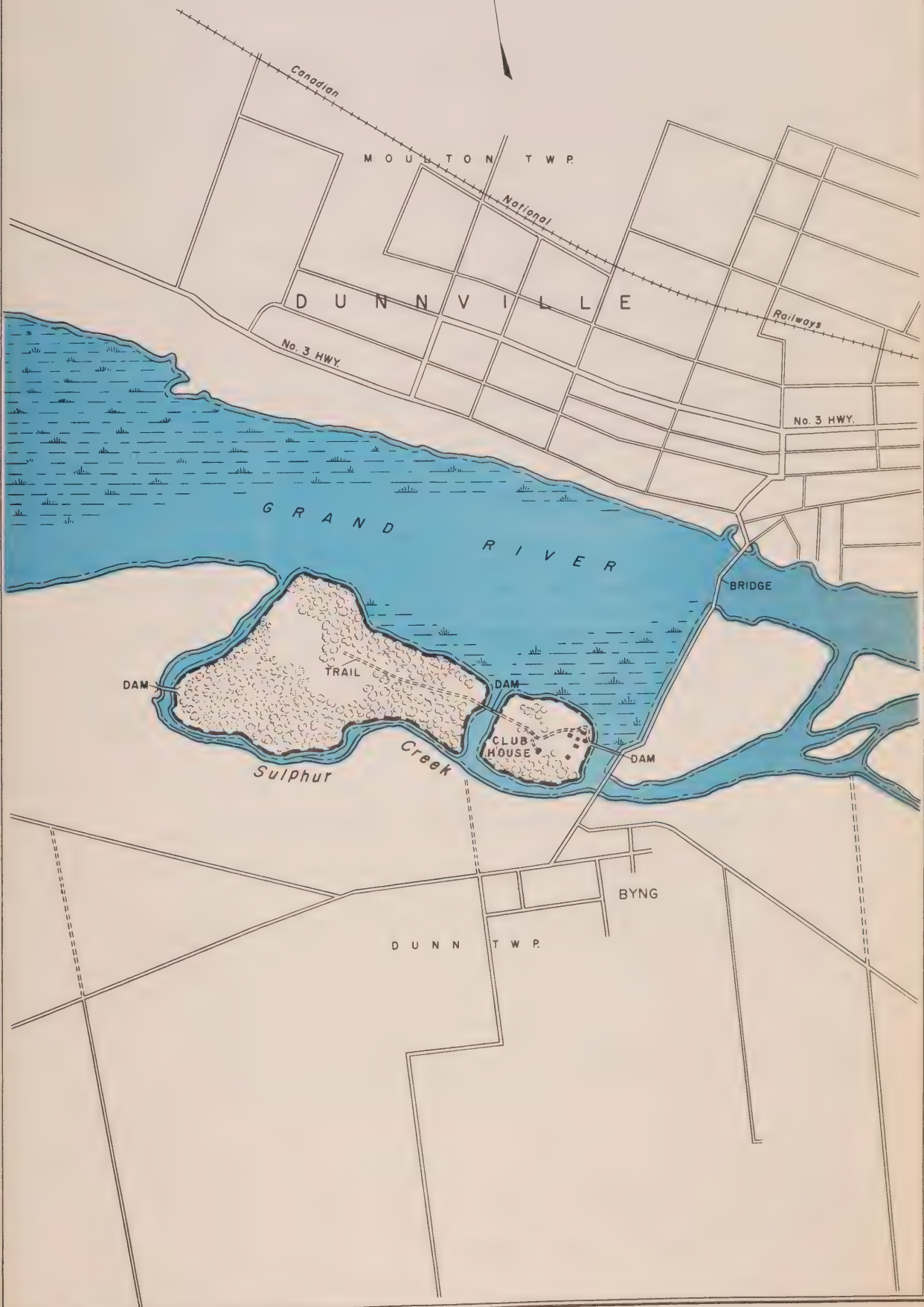
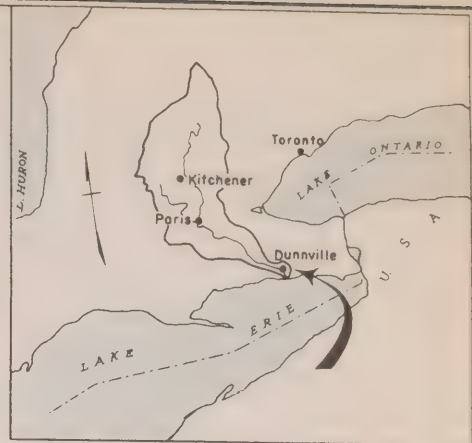
The islands are bounded on the east by the channel of the Grand River. On the west they are separated from the mainland by Sulphur Creek. The waters of this area, while unsuitable for swimming, are satisfactory for boating or

BYNG ISLAND PARK

—LEGEND—

-  PARK BOUNDARY
-  WOODLAND
-  MARSH

scale: feet
950 475 0 950



canoeing. A canoe or shallow bottom rowboat can traverse the entire length of Sulphur Creek and move along the lateral channels as far as the foot of the dams. The Grand River at this point offers a broad expanse of water, over 1,000 feet wide. It is a relatively simple matter to portage a canoe or light rowboat over the dam beneath the barrage bridge from where an unobstructed passage is available to the mouth of the river at Port Maitland.

The fishing in this section of the river, although in somewhat of a decline in the past few years, is still an important recreation asset.

The islands were developed to perform certain functions in connection with the provision of water for a feeder channel to the Old Welland Canal. In order to maintain water levels at desired heights, three small dams were constructed to join these islands to each other and to the mainland and a large dam was built across the main Grand River. The location of these dams is indicated on the accompanying map.

Several buildings were erected for maintenance and storage purposes. All of these are confined to the smaller and more southerly of the two islands. They consist of a solid two-storey brick house, which appears from the outside to be in excellent condition, a large barn and a number of small sheds.

The use of these islands for recreation purposes will not cause any interference or hardship to any particular group. The original need for the feeder canal no longer exists and since 1926 these installations have ceased to perform the job for which they were initially constructed.

It should be noted that if the main dam across the Grand River at Dunnville were removed, it would not destroy the recreation value of the islands. In fact, it would create about 1,000 additional acres of valuable parkland on the eastern side of these islands. In addition the cost of maintaining the dam would be eliminated.



The broad expanse of reeds along the eastern margin of the islands provides a habitat for wildlife.



The oak and hickory trees of the northern island would provide excellent shade for picnic tables.

A small frame building, which is used as a club house by the Haldimand Hunters and Anglers Association, is situated about the centre of the more southerly island.

At the present time no part of this area is used for agricultural purposes. Hence no farmland will be retired from production.

In spite of the absence of installed recreation facilities, the islands enjoy great popularity with picnickers and fishermen. Almost every weekend, and especially on holidays, forty or fifty cars are parked on the island and along the highway approaches. A high percentage of the regular visitors are negroes from Buffalo. They are attracted by the fishing in the area and the boat rental facilities. The Haldimand Hunters and Anglers have a small firing range here and hence the members of the club are fairly regular visitors.

The general appearance of the area is very attractive to the passing motorists. The weeping willows which line the southern margins of the island, and the white water pouring over the dam produce an effect of great beauty.

(b) Accessibility

Although the area is situated at the southern extremity of the Grand Valley, it is nevertheless readily accessible to regional concentrations of population to the east and north-east.

Over 335,000 people reside within a 25-mile radius of this proposed parkland* and speedy access is possible over paved highways. Moreover this suggested development is within easy reach of several large urban centres just beyond this 25-mile radius. Five cities with a combined population of 881,000 are within a short drive. The Greater Brantford area with a population of 56,000 is 45 miles distant and direct access is available down Highway No. 54. St. Catharines, with

* Hamilton falls within this 25-mile radius.

a population of over 38,000, is within easy reach. Niagara Falls, Ontario, with approximately 25,000 residents, is 50 miles distant. On the American side, Buffalo, with a population of approximately 670,000, is 40 miles away and Niagara Falls, with approximately 92,000, is also within a convenient distance.

(c) Proposed Development

These islands can be satisfactorily developed as a multi-purpose park. However, considerable forethought must be given to the spacing and arrangement of facilities. Picnic tables and fireplaces should be established in scattered locations throughout the area. These will serve the requirements of the fishermen and private picnickers who seek a quiet location. There will be sufficient space for a central playing field. This should be adequately screened from the rest of the park area by shrubs and trees. A central picnic pavilion could be erected if required.

Splendid walking trails can be established around the margins and through the heavily wooded section. A central roadway, which was probably established during the construction of the dams, already provides access through the heart of the islands.

At the present time cars are not permitted to pass over the dam joining the two islands, although the roadbed over the dam is wide enough. It would be advisable to continue to prohibit automobiles on the more northerly island and thus maintain an atmosphere of peace and seclusion.

The immediate improvements required for the establishment of these islands as a popular parkland will not be extensive. A general clean-up of the area and the provision of picnic tables, fireplaces and garbage receptacles would be sufficient to attract visitors in large numbers.

6. Parks of the Lower Grand

Two small parklands with a combined area of 61 acres are recommended for the banks of the Lower Grand River.

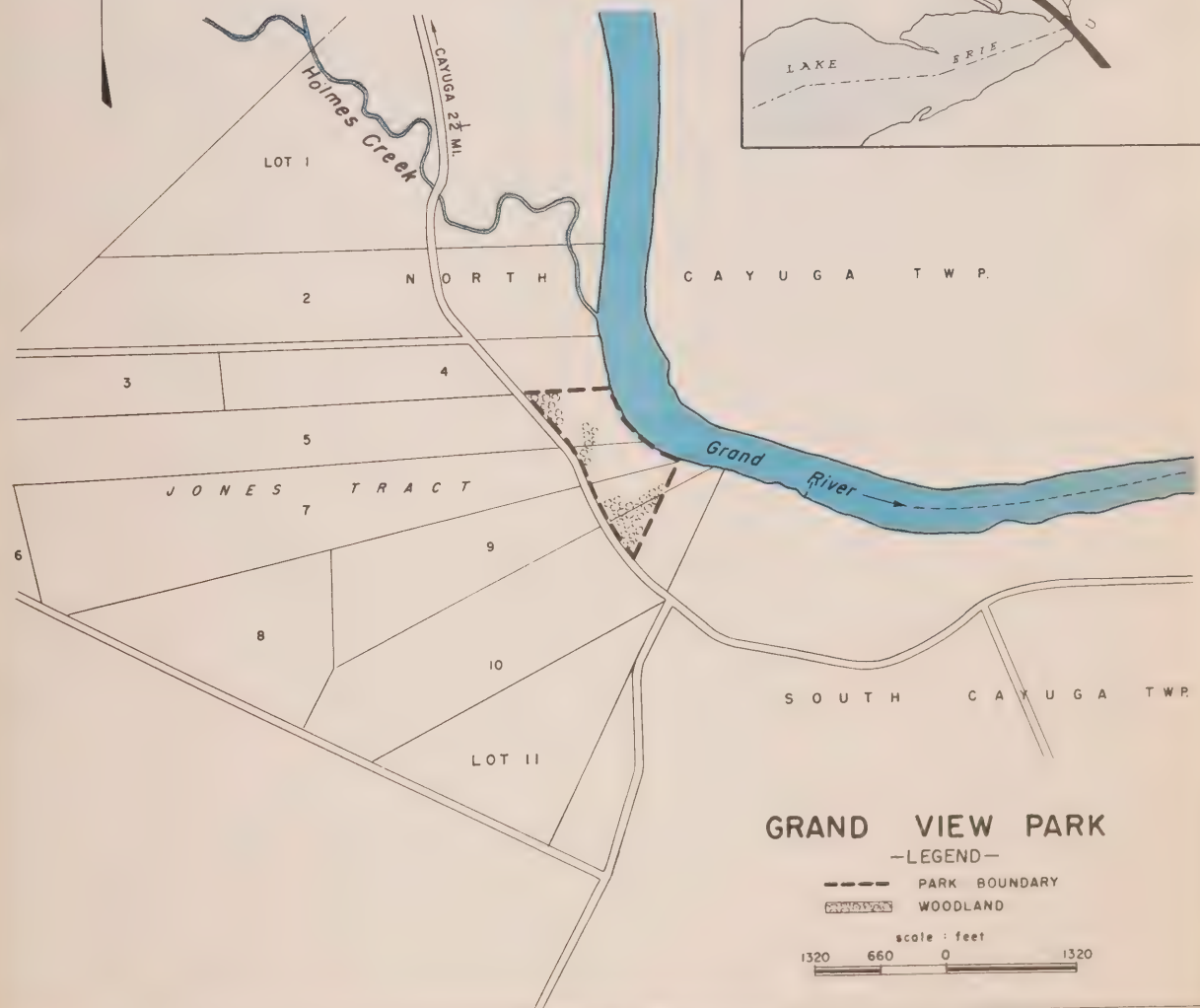
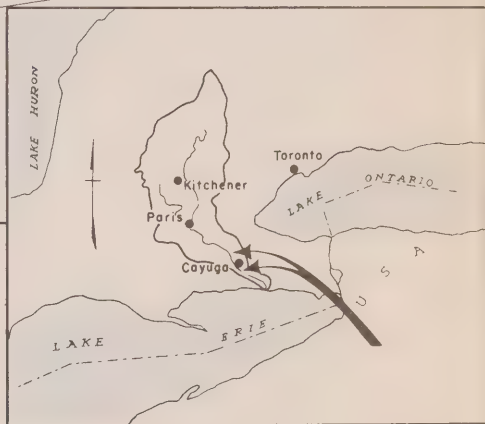
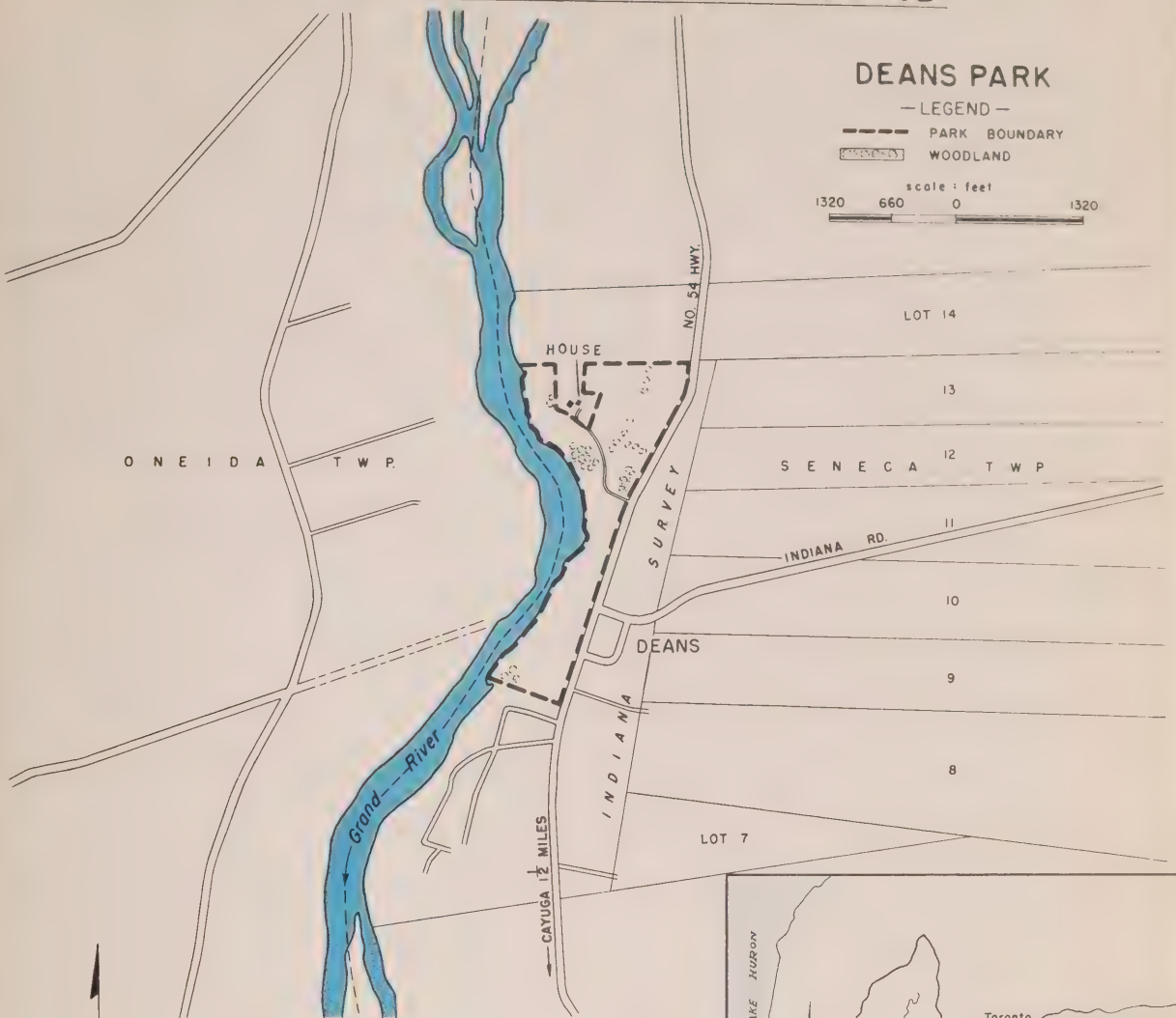
PARKS OF THE LOWER GRAND

DEANS PARK

—LEGEND—

- PARK BOUNDARY
- WOODLAND

scale : feet
1320 660 0 1320



GRAND VIEW PARK

—LEGEND—

- PARK BOUNDARY
- WOODLAND

scale : feet
1320 660 0 1320

With such an evident need for recreation space in this area, the limited scale of the developments proposed for this district will undoubtedly be questioned. It is frankly admitted that the park areas planned for the Lower Grand are insufficient. The developments must be regarded as emergency undertakings which should be augmented in the near future, either by expansion from the central core of these parks or by the selection and development of additional sites.

(a) Deans Park

(1) Description of the property

The largest of these parks, roughly 42 acres in extent, lies on the east bank of the river at Deans in Seneca Township and occupies the site of the old village of Indiana.

The proposed park contains a considerable expanse of river bottom land in addition to valley slopes. The views obtained from the higher land are attractive and there is sufficient level land available for the establishment of playing fields, picnic sites and a car park.

This property is not heavily wooded. There is a grove of large sycamore trees at the northern extremity which will provide excellent shade for picnic purposes. A small plantation of conifers is situated at the southern boundary.

The Grand River flanks the entire length of the western boundary of the park. At this point the stream varies from 130 feet to 250 feet in width.

The land use pattern of the area is indicated in the following table:

Present Land Use, in Acres

Woodland	3
Pasture	39
	—
Total	42

The park includes about 34 acres of land which is now used for pasture purposes. While most of this is in unimproved pasture, perhaps half the area could be seeded down

to good grass if so desired. The three acres of woodland includes a small coniferous plantation and a grove of sycamore trees.

The need for public parkland along the banks of the lower reaches of the Grand River is most pressing. Any hot summer week-end, hundreds of cars can be found parked in every available roadside space from Caledonia to Dunnville. The heaviest concentration is usually encountered in the area between Caledonia and Cayuga.

(2) Accessibility

The density of population surrounding this park closely approximates the figures presented in connection with the discussion on the establishment of an Authority Park at Byng Island.

The area lies immediately alongside a section of Provincial Highway No. 54 and hence access is good for all residents of the lower part of the Grand Watershed. The road network converging on the park from Hamilton is exceptionally convenient for the residents of that city and therefore a high attendance from here is assured.

It should be noted, however, that the importance of the Buffalo-Niagara region in the expected attendance at this park will not be as great as in the case of Byng Island. While some American residents will utilize these facilities, they will never be as popular with them as are those at Byng Island.

(3) Proposed development

This parkland, due to its limited size, can never contain all the facilities proposed for the larger multi-purpose park areas. In many respects it can be considered more in the realm of a large-scale picnic site development than a regional park.

An immediate clean-up of the grounds will be required and this will not be difficult due to the open nature of the land. Much of the property will have to be seeded down to a new grass cover. A number of deciduous shade trees, fairly

advanced in growth, must be planted throughout the grounds.

The provision of a roadway and a parking lot will be necessary. Fireplaces and picnic tables can then be set out in the most suitable locations and a drinking water supply provided.

The fishing in the area, while it has undoubtedly deteriorated in the past few years, is still good enough to attract hundreds of people every year. At the present time the waters of the Grand River are too polluted to be satisfactory for swimming.

As previously stated, this park is located on the site of the former village of Indiana. In pioneer times, this was a village of considerable size and importance and undoubtedly some of the historic associations of the site could be advantageously exploited to lend colour and general interest to the development.

(b) Grandview Park

(1) Description of the property

This small, 19-acre parkland in North Cayuga Township is situated almost entirely on a high and steeply sloping west bank of the Grand River, about three miles south of the village of Cayuga.

The view of the river from this site is one of the finest in its entire course south of Brantford and the scenic quality of the landscape is undoubtedly one of the outstanding attractions of the area.

Sufficient flat land is available for the parking of cars between the road and shoulder of the river bank, but the establishment of large playing fields will be impossible. Topographically the parkland is suited almost exclusively to picnic purposes.

About four acres of hardwood are located on the property and from the point of view of tree cover this parkland is superior to the larger area at Deans.



A view of part of the proposed park at Deans immediately adjacent to Highway No. 54 about a mile and a half north of Cayuga.



A splendid view of the Grand River from the proposed Grandview Park on the west bank of the river two and a half miles south of Cayuga.

Opposite the recreation area, the Grand River is over 500 feet in width and navigable for small craft for a good distance above and below the site.

The current land use pattern is summarized in the table below:

<u>Present Land Use, in Acres</u>	
Woodland	4
Pasture	8
Unimproved land	7
<hr/>	
Total	19

Only eight acres of land, which are situated on a steeply sloping bank, are now in pasture. About seven acres of shallow soil overlying limestone bedrock and covered with scrub brush forms the entire northern half of the area. Four acres of land situated in the south-west corner of the parkland are covered with hardwood bush and a few scattered white pine trees.

While the development will remove some pasture land from production, no undue hardship will be caused to farm operators in the area. The land retired from production will not be highly productive river flats. In addition, the provision of public recreation land should relieve the farmers of the area from the problems associated with the regular weekly trespass on their properties by the army of picnickers, who descend upon the banks of the Lower Grand from the adjacent centres.

(2) Accessibility

Many of the advantages of central location which were attributed to the park at Deans are equally applicable in this instance. Although the park does not lie immediately alongside Provincial Highway No. 54, it is but a short distance away. The motorist may conveniently leave the highway and cross to the west bank of the river by the bridge at Cayuga, and then travel south over a good gravel road for three miles.

(3) Proposed development

The plan of development for this area is similar to that envisaged for the park at Deans. A few picnic tables and fireplaces could be placed throughout the area and a water supply made available.

At this point the river is very suitable for boating, since it is both broad and deep for long distances to the north and south of the park. Hence it would be feasible for the Authority to rent boats from this recreation area. They should prove popular from early spring to late fall for fishing, hunting and pleasure purposes.

CHAPTER 10

PICNIC SITES

The establishment of a network of small picnic sites throughout the Grand Valley is an important part of the recreation program proposed for the watershed. The currently intensive use of the riverbank areas by picnickers is a good indication of the popularity that these developments will undoubtedly acquire.

A total of 125 picnic sites and four lookout points have been recommended for possible development. These areas would, at maximum capacity, provide parking space for about 850 cars and facilities for over 3,000 people. Over 435 tables would be required and approximately 175 outdoor fireplaces.

Thirty-five of these sites are located along the banks of the Lower Grand River and its major tributaries. One hundred and nineteen are located on the streams in the Central Hilly Belt. Eleven are found in the Flat Northern Plains of the river basin.

An attempt was made to separate these sites into three classes. The ideal Class I picnic site should be located on well drained land in picturesque surroundings adjacent to a stream or pond which is suitable for swimming or wading. Ample shade must be present. The area should be readily accessible to the public and the development should cause a minimum of interference with existing forms of land use in the area. In addition the site should require only limited improvements in order to be made usable.

On the basis of comparison with conditions generally prevailing throughout the watershed, 48 of the sites can be considered first-class picnic areas. The majority of the locations, 67, are second-class. The value of many of these could be greatly enhanced by judicious planting of shade trees. The remaining 9 are third-class sites. The sites are

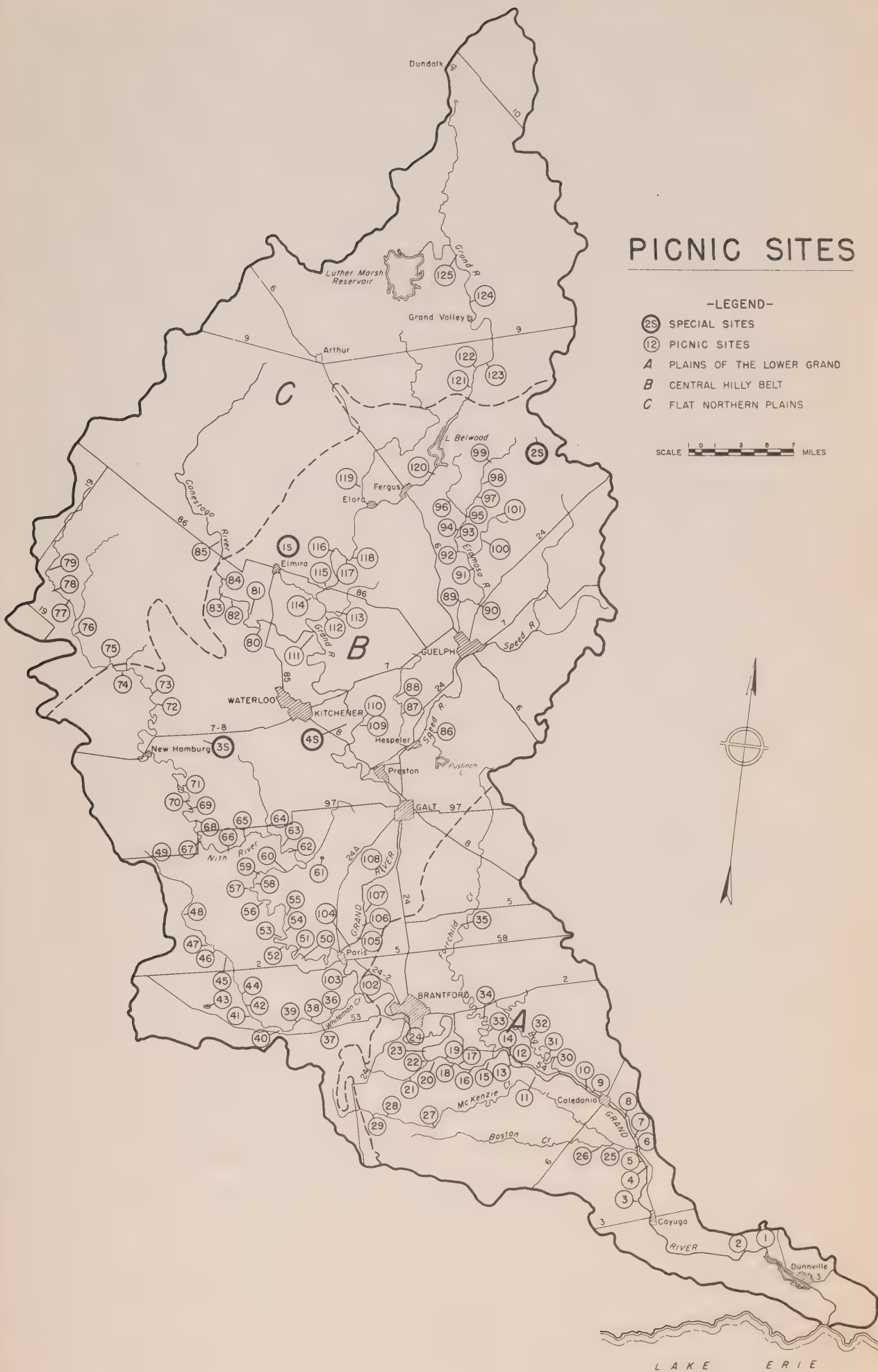
situated at scenic points of considerable recreation value and are integrated with the secondary highway network of township and county roads. In most cases they will be adequately screened from the noise and dust of passing traffic.

The development of these picnic table areas should not be elaborate. They are intended mainly as resting and lunching locations for those who are touring about the valley on sight-seeing trips. Some of the more exceptional sites will, however, serve as day-long picnic areas. After having cleared away any weeds and underbrush present and provided a satisfactory entrance and parking area for automobiles, it will be necessary to set out picnic tables, waste containers and sometimes fireplaces. The availability of drinking water is, of course, a decided advantage to any site. However, few of the selected sites possess this resource and people are expected to bring their own supply. Wells could be drilled in some areas if the demand warranted it. More elaborate installations at any particular site will largely depend on the proven popularity of the area at the end of a few years of operation.

In the main, this will be a non-revenue producing service provided by the Conservation Authority for the residents of the valley. The sites are too scattered and of too small a capacity to render the collection of charges effective or possible.

Consideration was given to the possibility of utilizing some of the rural school grounds for picnic purposes during the summer vacation period. These areas are usually equipped with an outdoor pump and often possess a ball screen and some playtime facilities such as swings and children's teeters. However, in the majority of cases these grounds are not really attractive to picnickers and none were selected for use in this program.

Picnic sites have been grouped in relation to their location and the main river and its tributaries and are indicated on the accompanying map.



1. The Lower Grand River

The well shaded grass-covered banks of many of the more picturesque sections of the lower reaches of the Grand River are very suitable for picnic site development. Although the waters of the Grand are unsuitable for swimming, boating and fishing are good in many parts. In addition, the whole area lies in close proximity to Highway No. 54 and bridges at Dunnville, Caledonia, Cayuga and York give the motorist speedy access to the opposite bank.

These river banks are already a popular picnic area and every fine weekend hundreds of people flock into the area to make use of every available stretch of idle land along the river bank that will provide shade and parking space. There is no doubt that these improved sites will prove popular.

Although many of the sites are situated close to Highway No. 54, there will be no conflict with the existing picnic table program of the Department of Highways. Many more tables are required here than are now present. The Authority sites will be removed from the main highway and suitable for day-long picnics rather than short stop-overs.

Several of the proposed sites are situated on Indian Reserve territory and some arrangement would be required here other than land purchase. Some of the sites are extremely attractive and it would be advisable to attempt development here with the co-operation of the Reservation authorities.

Special mention should be made of sites 4, 7 and 8. When Highway No. 54 was recently straightened and improved, several stretches of the road which formerly skirted the river were abandoned and the new route placed further from the bank. Those stretches of old road bed are very popular as picnic sites since they offer the public easy access to the river. It would be advisable for the Grand Authority to gain title to these areas. If at a later date it is decided to establish public footpaths along the river, these lands could provide a good beginning for such a program on the Lower Grand River.

A total of 24 picnic sites has been selected along the banks of the Lower Grand River below Brantford. When compared with average conditions for all sites within the watershed, 2 of these locations can be considered Class I sites, 18 Class II and 4 Class III.

If all the sites were developed, there would be parking space for about 200 cars or 800 people. At least 100 tables and 50 fireplaces would be necessary.

2. McKenzie Creek

McKenzie and Boston Creeks, tributaries of the Lower Grand River, are not generally conducive to picnic site development. These creeks are of rather insignificant proportions during the summer season, and flow through a level monotonous plain. The areas are somewhat removed from population concentrations and the main flow of traffic throughout the region.

However, five sites, Nos. 25 to 29 inclusive, have been selected. Three of these locations are second-class sites. One first and one third-class site are included. Area No. 27, which is situated on a beautiful pond at the upper end of McKenzie Creek in Norfolk County, has outstanding merit. This pond is now used for swimming and picnics. The development of this splendid area, which should accommodate 25 cars, would be highly desirable.

In total these picnic areas should provide accommodation for 35 cars. At least 15 tables and 6 fireplaces are required.

3. Big Creek

This Creek is subject to the same limiting factors as McKenzie Creek, namely summer shallowness, isolation and competition from far superior sites a short distance away on the banks of the main Grand.

Many sections of Whiteman Creek, such as this popular swimming hole, should be developed as picnic sites.



The straightening of Highway No. 54 has left a number of road cut-offs similar to this. The narrow strip of land between the Grand River and the highway should be developed as a picnic site.



There are many good picnic sites along the Nith River, such as this about a mile south of Haysville.

Only three sites, Nos. 30 to 32 inclusive, have been selected in this area and all are second-class locations. Five picnic tables and 2 fireplaces would be ample for this area, which will accommodate about six cars.

4. Fairchild Creek

Fairchild Creek, even though it reaches into the southern fringes of the Central Hilly Belt, possesses few topographic features or aquatic resources of sufficient value to warrant large-scale picnic table developments. The limiting factors are similar to those mentioned in connection with Big Creek and McKenzie Creek.

However, three sites have been selected here. These are Nos. 33 to 35 inclusive. All sites are second-class. Site No. 33 is worthy of special consideration since a well wooded 30-foot cut back of the creek offers some splendid scenery which can rival the main Grand in many respects. This area would accommodate 10 cars and would require 5 tables and 1 fireplace.

5. Whiteman Creek

This creek possesses some of the most desirable picnic site areas in the watershed.

Whiteman Creek flows for its entire length in a broad and sometimes deeply entrenched valley cutting through the southern edge of the Central Hilly Belt. From a point about a mile north of Burford to its confluence with the Grand River, midway between Paris and Brantford, the creek flows in a steep-sided and well wooded valley of great natural beauty. Westward from the above point the valley is less steep and less well defined. The topography of the area is not so striking but often quite satisfactory for picnic sites.

Compared with many streams in the watershed, the waters of Whiteman Creek are relatively clean. Many sections are deep enough for good swimming and the frequently encountered sand and gravel bars are ideal for sun-bathing and picnicking.

The strategic location of this area with respect to the heavy concentration of population in the Brantford area greatly enhances the value of the creek. At a short distance to the south, Highway No. 53 leading westward from Brantford roughly parallels the creek. The county and township roads running northward across the stream provide easy access to the picnic areas. All the picnic sites are less than a half-hour drive from the western limits of this city.

Several commercial parks and permanent summer camps have been established along the banks of Whiteman Creek and in recent years some cottage development has occurred. Realizing the strategic location of the area and its popularity for its residents, the City of Brantford recently secured Rest Acres for development as a public park.

In view of the foregoing considerations, it would be wise for the Grand Authority to concentrate considerable attention on the development of sites in this area before pressure for recreation space drives prices far beyond reach.

It might prove advisable to secure some fairly large picnic areas here to accommodate an almost assured heavy demand. There are one or two locations where it might be possible to obtain up to 50 acres of land for development as a small multi-purpose park of somewhat lesser proportions than those already recommended. Although these areas cannot be compared to Rockwood or the Elora Gorge with respect to spectacular scenery, they do possess a remarkable attractiveness and are quickly reached from Brantford, Galt or Paris. In this respect site No. 40 has particular merit.

Fourteen sites, Nos. 36 to 49 inclusive, have been selected at various points along Whiteman Creek. Six of these areas can be considered Class I sites, seven Class II and one Class III.

If all sites in the area were developed there would be facilities for about 180 cars. Approximately 80

tables and 25 fireplaces would be necessary.

6. The Nith

The Nith River flows through the heart of the Central Hilly Belt in a broad and often steep-sided valley of superb beauty. The level but usually well drained pastoral river flats are frequently clothed in a mantle of open hardwood stands which are ideally suited for picnic purposes. The waters of the Nith are often deep enough for swimming and wading. The proximity of this river to urban centres greatly enhances the value of the area. The Nith is the most naturally suitable river for picnic site development of all areas within the watershed.

The river is of outstanding importance in the picnic site program of the Grand Watershed. Thirty sites, Nos. 50 to 79 inclusive, have been proposed for this area. Approximately 21 of these areas are Class I site and 9 are Class II.

If all sites along this river were developed, there would be facilities for about 180 cars. Approximately 100 tables and 40 fireplaces would be needed.

7. The Conestogo

In view of the fact that the natural scenic beauty and ready accessibility of the area compare very favourably with the Nith River, one might have expected that more sites would have been selected in this area. However, the new dam which is under construction on the Conestogo must be taken into consideration. It indirectly will create a resource of considerable recreation value.

Only 6 sites, Nos. 80 to 85 inclusive, have been chosen for this area. Four of these are Class I sites and two are Class II. They would provide facilities for about 45 cars. Approximately 20 tables and 8 fireplaces would be required.

8. The Speed

For almost their entire length, the Speed and Eramosa Rivers flow in deep and broad valleys of considerable natural beauty. The pleasing and varied topography which results from a multiplicity of oval-shaped hills and tumbled bouldery ridges threaded with an intricate maze of broad glacial valleys, is ideally suited to picnic site development.

The sharp contrast between the hardwood forest cover of the uplands and the almost solid conifer stands of the valleys lends an attractive variety to the sylvan cover of the area. The vegetative composition of the valley floors, with their densely packed stands of cedar, contrasts sharply with the open hardwood groves which are characteristic of the Nith and Conestogo. Where this coniferous cover is intermingled with outcropping limestone bedrock, as at Rockwood, an extremely picturesque landscape results. Such a natural setting, which seems to recapture momentarily the spirit of the rugged frontier environment, has a peculiar fascination for many and perhaps partially explains the presence of so many youth camps in this area.

Although swimming is not possible at most of these sites, the shallow but relatively clear and fast-moving water of many of the streams makes them very attractive. Unfortunately many sections of the river in the vicinity of Guelph, Hespeler and Preston have become seriously polluted. This factor, along with the industrial and urbanized nature of the areas immediately surrounding these cities and towns, has prevented the selection of any sites below Guelph.

The headwaters of these rivers often take their rise in soggy, spring-fed swamplands which are unsuitable for picnic site development - hence the lack of sites here.

Although this area is not so quickly reached from the urban centres of the middle parts of the main Grand River as the Conestogo and Nith Rivers, it is by no means

beyond the reach of day-long picnickers, and is convenient for the residents of Guelph.

A total of 16 picnic sites, Nos. 86 to 101 inclusive, has been selected in this area. Seven are Class I sites, seven Class II and two Class III. If all the recommended sites were developed, there would be facilities for 75 cars. About 45 tables and 15 fireplaces would be required.

9. The Middle Grand

The Grand River between Paris and Galt flows through the southern section of the Central Hilly Belt in a magnificent, deeply-carved valley of impressive proportions. Here is to be found some of the most beautiful scenery of the watershed and some of the finest of any river valley in Southern Ontario.

A large proportion of the valley walls and a considerable percentage of the river flats have remained in coniferous and hardwood forest. The blaze of autumn colours annually associated with this area is exceptionally picturesque.

The central location with respect to the centres of population is obvious and the sites are readily accessible over improved roads.

Nine sites, Nos. 102 to 110, have been located along the banks of the middle course of the main Grand River. One of these areas is a Class I site, seven are Class II and one Class III. These should provide facilities for approximately 45 cars, and will require 25 picnic tables and 9 fireplaces.

10. The Upper Grand

Although natural conditions here are generally not as favourable as those in the area between Elora and Conestogo, these more northerly sites are not without their own particular charm and some developments are necessary in the extreme northerly section of the Grand to supplement the scenic route program.



The wooded slopes surrounding this small pond lying in a hollow in the rough, hilly land about a mile east of Ayr, would make a splendid picnic site.



From the summit of the Baden Hills an excellent view of the surrounding countryside is obtained. This hilltop should be developed as a lookout point.



A view from a point atop the Hillsburg Sand Hills that is recommended for development as a lookout point.

Fifteen sites, Nos. 111 to 125, have been selected here. Six of these are Class I sites, eight Class II and one Class III. If all sites were developed, facilities would be provided for approximately 65 cars. Approximately 40 picnic tables and 16 fireplaces would be required.

11. The Development of Lookout Points

In addition to the aforementioned picnic areas, three special sites have been indicated on the accompanying map from which exceptional vistas across the surrounding countryside can be obtained. From atop these relatively detached vantage points, an expanse of hill and valley unfolds in a panorama of great beauty.

Although these areas fall into a somewhat different category from the previously discussed picnic sites, they will undoubtedly be considered attractive luncheon points by some people and therefore a few picnic tables should be placed here. Experience may prove that fireplaces are also warranted.

At these points it would be desirable to erect a form of panoramascope with which the observer could locate and identify the various features of the landscape. This instrument consists of an aerial photograph encased in glass, or a brass plate engraved with the major features of the landscape, mounted upon a pedestal. The features shown in the photograph, or those engraved on the plate, are oriented so as to relate to actual features on the landscape. For identification purposes, the observer then relates the landscape features to the plate with the use of a sighting vane.

(a) The Sandy Hill Tract

The first of these outstanding vantage points (1S) is situated a few miles north of Elmira, in Woolwich Township. It is located in part of the Waterloo County Forest known as the Sandy Hill Tract. From the edge of a knot of tumbled sandy hills, which reach an elevation of over 1,325 feet, a fine view of the country to the south can be obtained.

The smoke stacks and taller buildings of Kitchener and Waterloo, twelve miles distant, are clearly visible. Many of the higher ridges of the Central Hilly Belt can be seen some miles further to the south.

(b) Hillsburg

The second of these sites (2S) is located* atop a steep conical hill rising over 1,600 feet from the midst of an area of irregular sandy hills in Erin Township. From this point, excellent views are obtainable in all directions across a maze of scattered hills and cedar-covered valleys. About ten miles to the east, the sharp irregular outline of the Niagara Escarpment in the vicinity of Belfountain is visible. The area upon which this lookout point is located has been recommended for reforestation purposes. When acquired by this Authority a lookout point could be developed as suggested.

(c) The Baden Hills

The third site (3S) south of Highway No. 7, about a mile east of Baden, is situated on top of a steep conical hill rising about 125 feet above the general level of the surrounding countryside. At all points of the compass this site offers superb views over great distances.

At the present time a radio tower and transmitting station is located here, but this should not prevent the Authority from obtaining permission to develop a small section of the hill as a lookout point.

(d) The Chicopee Ski Club

The fourth lookout point (4S) is undoubtedly one of the most spectacular on the watershed. This site, over 1,100 feet in elevation, is situated on the property of the Chicopee Ski Club outside Freeport. From here a magnificent view of the general features of the region of the Middle Grand Valley unfolds before the eye.

* Erin Township, Lots 27 and 28, Con. V.

Although the area lies on privately developed recreation property, the Authority should be able to make some arrangement for its use during the summer season. This is an outstanding site and worthy of considerable attention.

CHAPTER 11
SCENIC DRIVES

As an important part of the recreation program six scenic drives are proposed, including in all about 400 miles of roads. They roughly parallel the main Grand River and three of its larger tributaries, the Nith, Conestogo and Speed Rivers.

Each route has been individually designed to satisfy the requirements of a motorist wishing to undertake a reasonable day's driving.

Beauty has, admittedly, a highly personal or subjective value. Urban dwellers who rarely leave the city may find charm and beauty in a normal rural landscape that the local farm population considers ordinary. Some of the scenic routes selected possess outstanding quality only in the spring or fall. The greatest extent of attractive scenery is to be found in the Route of the Conestogo, while the Route of the Lower Grand, in spite of some exceptional views, has the lowest rating. The following table shows the length of the routes and the proportions which might be considered attractive by the average person when compared with conditions generally prevailing through the watershed.

SCENIC CONDITIONS ON THE GRAND ROUTES

Routes	Total Length	Scenic Length Miles	Percentage Scenic
Lower Grand	94	22	23
Middle Grand	76	42	54
Upper Grand	78	42	53
Speed	48	21	43
Nith	62	25	40
Conestogo	41	30	75

PROPOSED SCENIC ROUTES IN THE GRAND VALLEY LEGEND

- UPPER
- MIDDLE
- LOWER
- ROUTES OF MAIN GRAND RIVER
- ROUTES OF TRIBUTARY STREAMS
- HIGHWAYS
- A PLAINS OF THE LOWER GRAND
- B CENTRAL HILLY BELT
- C FLAT NORTHERN PLAINS

SCALE 1 0 1 3 5 7 MILES



1. The Lower Grand

This route, approximately 94 miles in length, roughly parallels the east and west banks of the lower Grand between Dunnville and Brantford. The total length is about evenly divided between both banks.

The east and west sections of the route are joined in the north by roads skirting the southern fringes of greater Brantford, while in the south they are joined by a paved county road crossing the Grand River at Dunnville.

There is a great variation in the quality of the roads associated with this route. Over 30 miles on the north and east bank of the river follows the tarmack-covered Provincial Highway No. 54. Many sections of this highway have been recently improved and are in excellent condition. A little over 14 miles of gravel-covered county road, between Cayuga and a point just north of Dunnville, forms the remainder of the route on this side of the river.

As noted in the table, about a quarter of the route lying alongside the Grand River is very attractive. The scenic lengths are about equally divided on both sides of the river route.

On the north and east side of the route, the area from No. 2 Highway at Cainsville to Onondaga is almost completely removed from the Grand River and cannot be considered scenic. From Onondaga to about a mile and a half below Middleport only periodic glimpses of the river can be obtained from the road. In the area between York and Caledonia the recent highway realignments have removed the roadbed a considerable distance from the riverbank. From the fourteen miles of gravel road between Cayuga and Dunnville, only occasional views of the Grand are encountered. However, in spite of this, there are many beautiful areas at intervals along the route which make it an attractive drive.

The west river route, although removed a considerable distance from the river in many places, possesses

some exceptionally fine scenery from York to Newport.

The proposed Byng Island Park lies at the southern extremity of the route and other parks are planned in areas just south of York and Cayuga. About 20 separate picnic sites, with a capacity of over 100 cars, will be scattered along various sections of the route.

2. The Middle Grand

This route, 76 miles in length, generally follows the roads adjacent to the east and west banks of the Grand River between Provincial Highway No. 2 at Brantford and Highway No. 7 just a short distance east of Kitchener. Between Galt and Blair the route has been restricted to the west bank of the river.

Road conditions vary greatly. Over 44 per cent of the total length of the roadbed is paved. About 21 miles of this improved road is Provincial Highway and 12 county road. The remaining 56 per cent of the route is gravel-surfaced and consists of about 3 miles of county road and 38 miles of narrow township road.

The provincial highways and county roads are all satisfactory for the purpose of this program. However, many sections of the township roads will need some attention. The southern end of the west river road close to the former Glenbrook Recreation Park is extremely steep and winding. Similar conditions are repeated in several other small stretches of road.

This route, classified previously as 54 per cent scenic, is undoubtedly one of the most picturesque in the entire program. Between Galt and Paris, the Grand River is deeply entrenched in a steep-sided valley cutting through a series of boulder ridges running in an east-west direction across the watershed. In many places on the east side of the river the paved highway runs within full sight of the water for long stretches. In this area, the road is often

located close to the upper edge of the valley and affords a magnificent view across the beautifully wooded landscape. The route from Galt to Preston, along the west side of the river, also presents some exceptionally fine scenery. The section through Blair, Doon and German Mills has already received wide acclaim as one of the outstanding scenic localities in all Southern Ontario.

There will be sufficient recreation facilities established along this route to satisfy the demands of the motorist. Over a dozen picnic table sites lie adjacent to the route. Two proposed Authority parks will lie astride the route, one in the Spottiswood Lake area between Galt and Paris and the other at Doon.

Due to a combination of good roads, superb scenery, adequate complementary recreation services and close proximity to large urban centres, this route should be very popular.

3. The Upper Grand

The route covers a total distance of 78 miles and extends from No. 7 Highway to the Luther Dam on the Flat Northern Plains in the upper extremity of the Grand Watershed. The southern end of the route is linked to the upper part of the Route of the Middle Grand by a 3.7 mile stretch of Highway No. 7. At the Luther Dam a turning area will be available to commence the return journey.

It will be noted that the route is confined to a single road from Belwood to the Luther Dam. It was not possible to find sufficiently attractive scenery through which to lay out another route in this area. A similar difficulty was encountered between Highway No. 7 and a point east of Conestogo.

Where it has been possible to establish routes on both sides of the river, connections between the two are possible over bridges at Winterbourne, Elora, Fergus,

In many sections of the Scenic Route of the Lower Grand, broad and tranquil reaches of the river are in full view from the road.



The Scenic Route of the Speed frequently crosses lovely stretches of the river similar to this which is one and a half miles south of Speedside.



The Scenic Route of the Middle Grand passes across a broad expanse of the valley bottom at Blair.

Belwood and a number of intermediary points.

Only 1 per cent of this route is to be found on provincial highways. About 45 per cent, or 35 miles, is located on county roads and approximately 46 per cent of these are tarmack-surfaced. The remaining 54 per cent, or 42 miles, of the route is associated with township roads. In total over 78 per cent of the roads of the route are gravel-surfaced. Conditions here are generally satisfactory.

A very high percentage of this drive (53 per cent) can be classified as scenic. In addition, the Luther and Conestogo Dams will form an important attraction. The natural beauty of the Elora Gorge will also draw many tourists.

The route is well served with picnic sites and the newly created Gorge Park at Elora will provide facilities for thousands when completely developed. A small park at the Luther Dam and Shand Dam will handle additional crowds.

4. The Speed

The total length of this scenic route, which extends from Preston to the sandy hills in the vicinity of Orton, is only 48 miles. It will be noted that this drive, like those associated with other tributaries of the Grand River, has been almost entirely confined to a single-line road. This precludes the possibility of the circular tour and compels the motorist to return along the route taken in the outward journey. This course had to be adopted if the scenic portions of the route were to be maintained at a reasonably high percentage of the total length, and if the routes were not to be excessively complicated.

If the Authority desire, they could lengthen this route and provide a circular tour between Guelph and the present northern extremity of the drive. In this case, the route would be continued westward to strike the headwaters of the Speed River and then lead back to Guelph over roads roughly parallel to the main river.

Only 8 miles or 17 per cent of the route is associated with paved roads and all of this is provincial highway. The remaining 83 per cent is gravel-surfaced and only 7.4 miles of this is county road.

About 42 per cent of this route can be considered scenic. In addition, the drive presents a wide variety of interesting landscape patterns as it successively traverses several distinct topographic regions in the Central Hilly Belt.

The route commences in the valley of the Grand in the vicinity of Preston. Here the river meanders peacefully across a broad expanse of pastoral flats, frequently flanked with the beautiful open hardwood stands of the deeply carved and gently contoured valley walls. From this point the route carries the motorist into a region of scattered oval hills interwoven with an intricate maze of conifer-covered valleys. In certain areas such as Rockwood, where the bed-rock appears at the surface, exceptional scenery results from the distinctive combination of water, evergreens and weathered limestone. To the south of Eden Mills, the route parallels the northern edge of a linear belt of rugged bouldery hills, often more suited to forest than farm. The northern part of the drive enters a knot of tumbled sandy hills separated by swampy valleys clothed in evergreens. The variety of scenery is certainly a distinctive characteristic of this route.

The proposed parkland at Rockwood will provide the motorist with picnic table facilities. However, picnic table sites outside this park area will be very limited.

5. The Nith

This route, which generally follows the course of the Nith River from Paris to Milverton, is approximately 62 miles in length. Like the Route of the Speed it is almost entirely restricted to a single line.

Only 4 miles or 7 per cent of the route is paved and all of this is provincial highway. Of the remaining

93 per cent of gravel-surfaced road, only 11.8 miles, or 19 per cent, is county road. About 74 per cent of the route is associated with narrow gravel-covered township roads.

The scenic qualities of this route are exceptionally high and approximately 60 per cent of the total distance may be considered in this class. This is undoubtedly one of the most picturesque of all the scenic routes outlined in the report.

The drive will be exceptionally well serviced with picnic sites. The Nith contains some of the finest picnic areas in the entire watershed and already attracts thousands of motorists every summer.

6. The Conestogo

Although the last route to be discussed, this is by no means the least important of the scenic drives. Roughly paralleling the course of the Conestogo River, it covers a distance of 40.5 miles.

Approximately 30 miles, or 75 per cent of the total length of the route, may be classified as scenic. This extremely high percentage is one of the outstanding features of the drive. The Conestogo River, like the Nith in many respects, meanders through a broad flood plain enclosed in a deeply carved valley. The pastoral setting dominates the valley landscape. However, sufficient hardwood cover, often of an open parkland nature, is present to provide pleasing contrasts.

Sufficient picnic sites are planned for this route to provide facilities for over 50 cars. Some provision will most likely be made for picnickers at the proposed Conestogo Dam and the dam and reservoir should be an added attraction of this route.

CHAPTER 12

NATURE RESERVES AND HISTORICAL SITES

1. Nature Reserves

The establishment of publicly owned nature reserves, which are designed for the preservation of the significant natural features of the watershed, is an important aspect of the work of the Conservation Authority.

These reserves are designed to satisfy both education and recreation demands. This duality of purpose, which is characteristic of many aspects of a comprehensive recreation program, is well exemplified in these proposed developments. However, there is no essential conflict of interest between these two factors which will give rise to insurmountable difficulties in the operation and management of the reserves. Actually, education and recreation are complementary rather than antagonistic to each other.

The reserves will serve as laboratories for the instruction of students in the various branches of the natural sciences such as botany, zoology, geography and geology. Universities have long made it a practice to take students into the field to demonstrate the actual workings of the principles taught through textbooks and lectures. A similar procedure is now becoming common in high schools, and in some of the more progressive public schools. The success of this program of outdoor instruction depends on the preservation and satisfactory management of conveniently located study areas, such as proposed in this chapter.

The benefits received go beyond the provision of facilities for the professional scientist and the training of students, to the broader and equally important field of general and adult education. Upon these a deep and abiding culture has its foundations.

*"The true appreciation of scenery rests in part upon, and is certainly enhanced by, some understanding of what may be likened to its bony structure - the forms and dispositions of the rocks and the variety of landscape which these induce, the shapes of the valleys and summits, the flow of the streams... and all the rich verdure with which they are clothed. These are the things which can invigorate and refresh the mind and upon which a deep culture can be based. The more widely this appreciation can be diffused, the sounder will be the mental and physical health of the nation and the safer will become the places where these pleasures are to be enjoyed".

In addition to the educational values of the reserves, one must acknowledge their recreation aspects. Although these developments are not primarily intended for picnickers, they do satisfy the recreation requirements of a large group of people who spend their leisure hours observing nature. Bird watching, plant identification and allied activities are carried on by specialized groups who regard such activity as recreation just as much as baseball and swimming. Here we see the educational aspects of recreation most fully developed.

In the limited time available for the field observations necessary for the preparation of this report, it was not possible to investigate thoroughly all the potential nature reserve areas on the watershed. This will require a very intimate knowledge of the landscape, a thorough understanding of the requirements of educational institutions and nature clubs in the valley, and considerable liaison work with scientific workers who can present expert advice on the technical phases.

The Authority should appoint an Advisory Board to deal with all aspects of these developments. The Board would seek advice of professional scientists in the area and work closely with the accredited naturalist clubs of the watershed. It would be advisable to call a conference of all naturalists' clubs in the valley for this purpose.

* Conservation of Nature in England and Wales.
Report of the Wild Life Conservation Special Committee,
H.M.S.O. London, England Cmd, 7122, page 13.

It is worthy of note that significant geological, botanical and zoological phenomena are often associated with land of low agricultural capability which is only suitable for reforestation purposes. Rock outcrops often occur in the middle of large areas of shallow soil of low agricultural value. Important physiographic formations are often found in areas of rough, bouldery reforestation land. In view of the above considerations, the reforestation property of the Authority should be examined with respect to its potential use as a nature reserve.

Two significant areas were studied in some detail, in order to illustrate the general character of these developments, and are given here as examples of what should be considered. One site is worthy of preservation in view of its peculiar botanical characteristics, while the other is an example of the development of a geological monument.

(a) The Luther Swamp Botanical Reserve

The Luther Swamp, long recognized as a fascinating area of bog vegetation, has been a "mecca" for many botanists of South-Western Ontario. The construction of the Luther Marsh Reservoir in 1952 inundated a large part of the swamp. However, some areas of botanical interest, which are worthy of preservation, still remain around the margins of the reservoir. Much of the bog surrounding Wylde Lake still remains and this has always been one of the most interesting sectors from a botanical standpoint.

Lots 19 to 23 inclusive in Concessions IV and V of East Luther Township are suitable for preservation as a botanical reserve due to the variety of species encountered here. In addition the area is reasonably accessible to high schools at the northern end of the Grand Valley and to the universities of the region (McMaster, University of Western Ontario and the Ontario Agricultural College). Its educational value could be enhanced if properly publicized and adequately protected.

Some of the land owned by the Commission and some recently acquired by the Authority for reforestation could be included in this reserve. However, a considerable expanse of heath surrounding Wylde Lake and lying in Concessions IV and V of East Luther Township, still remains in private ownership. This should be purchased by the Authority and preserved as a botanical reserve.

No elaborate expenditure or supervision is contemplated for this development. The object of the scheme is the preservation of the area in its natural state. At the present time, fire and dumping of garbage are the two great hazards which threaten the destruction of the site. The indiscriminate destruction of plant life would, of course, be prohibited.

(b) The Oriskany Sandstone Geological Reserve

In the southern section of the watershed, about $4\frac{1}{2}$ miles north-west of Cayuga, is a large area of shallow soil overlying a frequently outcropping bed of sandstone. The central core of this outcrop lies partly in Concession I, north of the Talbot Road in North Cayuga Township, and extends roughly from Lots 45 to 49, while the remainder is situated immediately adjacent to it in Oneida Township. Several hundred acres of this area are covered in sumach, scrub oak and hickory.

This sandstone formation, which is termed Oriskany Sandstone by geologists, was the first of the rocks laid down during the Devonian age. Its exposure at the surface is relatively limited in Ontario, occurring only in about a half dozen localities. The best exposures in Ontario are found in the abandoned quarry of the Oneida Sand and Lime Company on the south-east corner of Lot 49, Concession I, Oneida Township; here about 20 feet of thickness is observable.

Geologists who are studying the rock formations of this region invariably visit this outcrop because it offers the best possibilities in Ontario for an examination of these



The famous old covered bridge at West Montrose, where King's Highway No. 86 crosses the Grand River, is the sole remaining covered bridge in Ontario. It was built in 1881 and for obvious reasons was known to three or four generations as the kissing bridge. In the summer of 1954 it was given a thorough overhauling and re-opened to the public on October 6.

beds. The Dominion Geologist, J. F. Caley*, made special mention of the quarry in his memoir on the Palaeozoic Geology of the Toronto-Hamilton Area. American geology students from Michigan University use the quarry for instruction purposes in their annual tours of Southern Ontario. Students from Ontario universities often visit the location.

It would be a serious loss if this quarry were filled in with rubbish. This is apt to happen if it is not protected by the Authority and preserved as a geological monument.

2. Historical Sites

In approximately a century and a half which has elapsed since the beginning of pioneer settlement, the primeval wilderness of the Grand Valley has been transformed into farmlands and modern urban communities. A knowledge of the history of this evolution, which is often accompanied by a personal or family association, has been a source of pride to the people of the valley and should be an inspiration for future accomplishment.

History has long held a fascination for many people who happily and profitably spend their leisure hours reading books or records and visiting historic sites. For many of these, the study of history is a form of recreation; the personal satisfaction of which can only be realized by those who have pursued it actively.

In addition, a knowledge of past history often has an immediate application to the solution of problems of the present. This is especially true with reference to problems of conservation. The gradual evolution of settlement in the Grand Valley is not a story of continued and unequivocal success unblemished by the marks of failures and mistakes.

* Geological Memoirs No. 224:
Palaeozoic Geology of the Toronto and Hamilton Area, Ontario.
J.F. Caley, Department of Mines and Resources, Ottawa, 1940.

Man's progress in the struggle against the forces of nature in this province is largely the result of trial and error and modification and adaptation. Lands were cleared for agricultural purposes that should have been left in forest. Buildings, roads, bridges and even whole towns, which were designed and erected to satisfy the requirements of a particular period, succumbed to changing conditions and disappeared from the landscape, or survived to plague the present generation which is forced to adapt them to current demands. A knowledge of past developments, viewed in the light of current conditions, can guide present planners away from the needless repetition of past follies and provide them with a firmer basis for the estimation of future trends and requirements.

In view of the foregoing considerations, the people of the Grand Valley should attempt to preserve the more significant monuments of their cultural heritage for the enlightenment and enjoyment of this and future generations.

A wide variety of features may be included within the scope of historic sites - schools, churches, mills, factories, barns, farmhouses, roads, Indian trails, bridges, pioneer cemeteries, and areas which have been the sites of former historic buildings or significant historical incidents.

Several historical societies are now actively engaged in recording the history of various areas of the watershed and preserving old landmarks. These include the Brant Historical Society, the Haldimand Historical Society, the Oxford Historical Society, the Waterloo Historical Society and the Wellington County Historical Research Society. In addition to these organizations there are also a number of township societies.

The Authority should work in close co-operation with these organizations for the mutual benefit of both parties. These societies possess an immense fund of historical knowledge and considerable technical experience which would be of great value with respect to the establishment of historic sites.

The Authority, on the other hand, can lend moral and material support to the work of the societies. The selection and marking of historical sites is a highly specialized type of work and merits the appointment of an Historical Sites Advisory Board.

60/4300

Ontario. Planning and Development, Dept. of
Grand Valley, conservation report, 1954.

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CONESTOGO RIVER WATERSHED

(GRAND RIVER SYSTEM)

FORESTRY MAP

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH



White Man Creek Watershed Map

WHITEMAN CREEK WATERSHED

(GRAND RIVER SYSTEM)

FORESTRY MAP

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH



*Gov. Doc. Ontario . Planning & Development, Dept. of
Ont. " Grand valley
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HORNER CREEK

LAND USE SURVEY 1953

RECOMMENDED LAND USE

ACCORDING

TO USE CAPABILITY

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT







CONSERVATION BRANCH

HORNER CREEK

LAND USE SURVEY 1953

RECOMMENDED LAND USE ACCORDING TO USE CAPABILITY





USE CAPABILITY CLASSES

SUITABLE FOR CULTIVATION		
CLASS I LAND		WITH NO SPECIAL PRACTICES
CLASS II LAND		WITH SIMPLE PRACTICES
CLASS III LAND		WITH INTENSIVE PRACTICES
SUITABLE FOR LIMITED CULTIVATION		
CLASS IV LAND		WITH SOME SPECIAL PRACTICES
SUITABLE ONLY FOR PERMANENT VEGETATION		
CLASS V LAND		WITH NO SPECIAL PRACTICES
CLASS VI LAND		WITH MODERATE PRACTICES

RECOMMENDED MANAGEMENT

C	LAND REQUIRING EROSION CONTROL BY CONTOUR TILLAGE METHODS
D	LAND REQUIRING ARTIFICIAL DRAINAGE
R	LAND REQUIRING RESTRICTIONS IN USE
T	RESTRICTED USE DUE TO ROUGH TOPOGRAPHY
P	RESTRICTED USE DUE TO INADEQUATE DRAINAGE

PRESENT LAND USE

	CULTIVATED LAND
	PASTURED LAND
	EXISTING FOREST
	IDLE LAND

